Procon
MelcoBEMS MINI (A1M)

FOR INSTALLERS

INSTALLATION MANUAL
Manual version 1.0.1

Firmware version 3.0.1

For safe and correct use, please read this installation manual thoroughly before installing the PROCON MelcoBEMS MINI (A1M).

Preface

Safety warnings

⚠ **Caution:**

Do not expose to rain or moisture.

⚠ **Shielded Signal Cables:**

Use only shielded cables for connecting peripherals to any Procon MelcoBEMS MINI (A1M) device to reduce the possibility of interference with radio communications services. Using shielded cables ensures that you maintain the appropriate EMC classification for the intended environment.

⚠ **CE Notice:**

This product has been determined to be in compliance with 2004/108/EC (EMC Directive) and amendments of the European Union.

⚠ **European Union, Class A:**

Class A products are intended for use in non-residential/non-domestic environments. Class A products may also be utilized in residential/domestic environments but may cause interference and require the user to take adequate corrective measures.

This is a Class A product. In a domestic environment this product may cause radio frequency interference in which case the user may be required to take adequate measures.

A “Declaration of Conformity” in accordance with the preceding directives and standards has been made and is available on request.

If this equipment does cause interference with radio communications services, which can be determined by turning the equipment off and on, you are encouraged to try to correct the interference by one or more of the following measures:

Reorient the receiving antenna.
Relocate the Procon MelcoBEMS MINI (A1M) with respect to the receiver.
Move the Procon MelcoBEMS MINI (A1M) away from the receiver.

If necessary, consult a Procon MelcoBEMS MINI (A1M) technical support representative or an experienced radio/television or EMC technician for additional suggestions.

Disclaimer

⚠ **Warranty:**

All products manufactured on behalf of Mitsubishi Electric UK are warranted against defective materials for a period of three years from the date of delivery to the original purchaser.

⚠ **Warning:**

Mitsubishi Electric UK assumes no liability for damages consequent to the user of this product. We reserve the right to change this manual at any time without notice. The information furnished by us is believed to be accurate and reliable. However, no responsibility is assumed by us for its use, nor for any infringements of patents or other rights of third parties resulting from its use.

Amendment Register

Document Version	Latest Firmware Version	Date	Author	Notes
1.0.0	3.0.0	08/05/15	GD	Initial version for firmware V1.0.0
1.0.1	3.0.1	16/06/15	GD	Added ‘Applicable Unit Type’ columns to Air-To-Water Modbus tables. Other minor modifications.

Any additional notes since printing will be appended to the rear of this document on separate sheets of paper.

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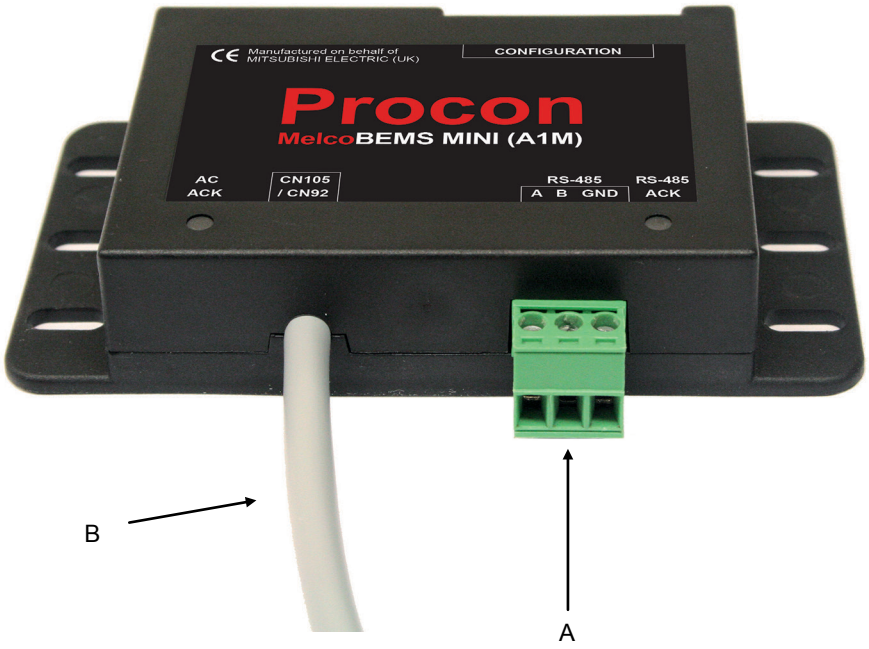
[Fig. 1]

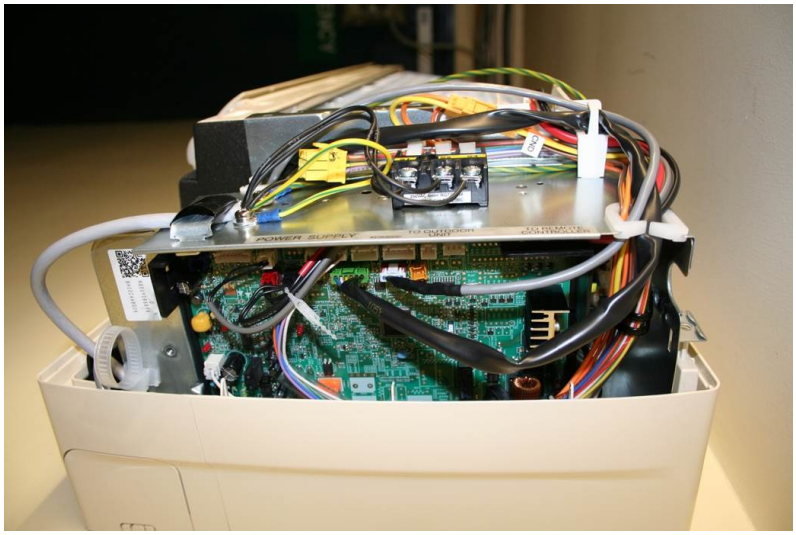


A RS-485 connector

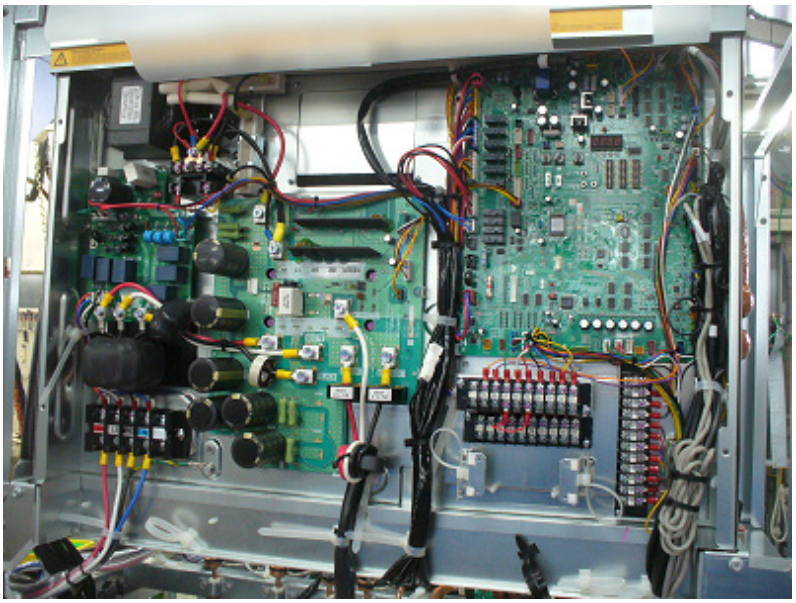
B CN105/CN92 connection lead

2

[Fig. 2]



Air to air unit



Air to water unit

Contents

1. Safety precautions

- **Before installing the unit, make sure you read all the "Safety precautions"**
- **The "Safety precautions" provide very important points regarding safety. Make sure you follow them**

Symbols used in the text

⚠Warning:

Describes precautions that should be observed to prevent danger of injury or death to the user.

⚠Caution:

Describes precautions that should be observed to prevent damage to the unit.

⚠ Warning:

- **Ask the dealer or an authorised technician to install the unit**
  - Improper installation by the user may result in electric shock, or fire
- **Use the specified cables for wiring. Make the connections securely so that any outside forces acting on the cables are not applied to the terminals**
  - Inadequate connection and fastening may generate heat and cause a fire
- **Never repair the unit. If the controller must be repaired, consult the dealer**
  - If the unit is repaired improperly, electric shock, or fire may result
- **Have all electric work done by a licensed electrician according to "Electric Facility Engineering Standard", "Interior Wire Regulations" and the instructions given in this manual and always use a special circuit**
  - If the power source capacity is inadequate or electric work is performed improperly, electric shock and fire may result
- **Keep the electric parts away from any water - washing water etc…**
  - Contact may result in electric shock, fire or smoke
- **To dispose of this product, consult your dealer**

⚠Caution:

- **Safely dispose of the packing materials**
  - Packing materials, such as nails and other metal or wooden parts, may cause stabs or other injuries
  - Tear apart and throw away plastic packaging bags so that children will not play with them - If children play with a plastic bag which has not been torn apart, they face the risk of suffocation

2. Overview

The Procon MelcoBEMS MINI (A1M) Protocol Converter is used for remote monitoring and control of both Air-to-Air products (M-, S- and P-series split air conditioning systems) and Air-to-Water products (CAHV, CRHV, PWFY). It acts as a gateway between the system and external third party equipment.

The MelcoBEMS MINI (A1M) continuously reads data from the system and changes configuration when necessary. Because the reading is continuous the MelcoBEMS MINI (A1M) always stores up-to-date data. This data is then available to external devices through the RS-485 port using the Modbus RTU software protocol. Values can be read and changed via this connection. Please refer to the Modbus section for further information.

The MelcoBEMS MINI (A1M) is powered via the CN105/CN92 connector, hence no external power supply is needed.

Compatible Air-To-Air model numbers can be found in Appendix A of this document.

⚠ **Caution:**

MAC-397IF and MAC-399IF units cannot be connected when the MelcoBEMS MINI (A1M) is connected, as the same CN105/CN92 connector is used.

Appendix A lists the compatible Air-To-Air indoor units.
Appendix B lists the compatible Air-To-Water indoor units.

Figure 1 shows the MelcoBEMS MINI (A1M) converter.

Figure 2 shows the CN105/CN92 connector on the indoor unit PCB that the MelcoBEMS MINI (A1M) connects to, for both Air-to-Air and Air-To-Water type units.

3. DIP switch settings

There is a bank of 8 DIP switches on the MelcoBEMS MINI (A1M) labeled 'CONFIGURATION'. These switches are used to configure communication settings and to enable some features.

3.1. RS-485 Node address

When BACnet MS/TP protocol has been selected (see section 3.3) the node address is used as the Station ID.
When Modbus RTU protocol has been selected (see section 3.3) The node address is used as the Slave ID.

Any node address in the range 1 – 30 can be chosen using switches 1 – 5. The address is set in binary, where the switch positions have the following values:

Switch number	Value when switch is set to ON
1	1
2	2
3	4
4	8
5	16

To get the node address, add together the value for each switch set ON. For example, to set address 13, set switches 1, 3 and 4 ON (1 + 4 + 8 = address 13).

When all switches 1 – 5 are set to the ON position the node address is set in software by writing to a Modbus register (see Modbus Holding Registers section).

Note: When all switches are set to the OFF position a node address of 1 is assumed.

Note: Each MelcoBEMS MINI (A1M) connected on the same RS-485 network must be set to a unique node address.

3.2. RS-485 communication settings

The RS-485 settings are set using DIP switch 6.
When the switch is in the OFF position the Baud Rate and Parity settings are set in software by writing to Modbus registers (see Modbus Holding Register section).

Switch 6	RS-485 communication settings
OFF	Baud Rate and Parity set in software
ON	9600 baud, no parity

The number of data bits is fixed at 8 and the number of stop bits is fixed at 1.

3.3. Protocol selection

The RS485 protocol is set using DIP switch 7.
When the switch is in the ON position the Modbus RTU protocol is selected.

Switch 7	Protocol selection
OFF	BACnet MS/TP
ON	Modbus RTU

3.4. Deadband mode

The Deadband feature can be enabled using DIP switch 8.

When the switch is in the OFF position the Deadband feature is disabled.
When the switch is in the ON position the Deadband feature is enabled.

Switch 8	Deadband feature
OFF	Disabled
ON	Enabled

4. Deadband Mode

The deadband mode is enabled by setting DIP switch 8 ON. It is only applicable to Air-To-Air type units.

4.1. Settings

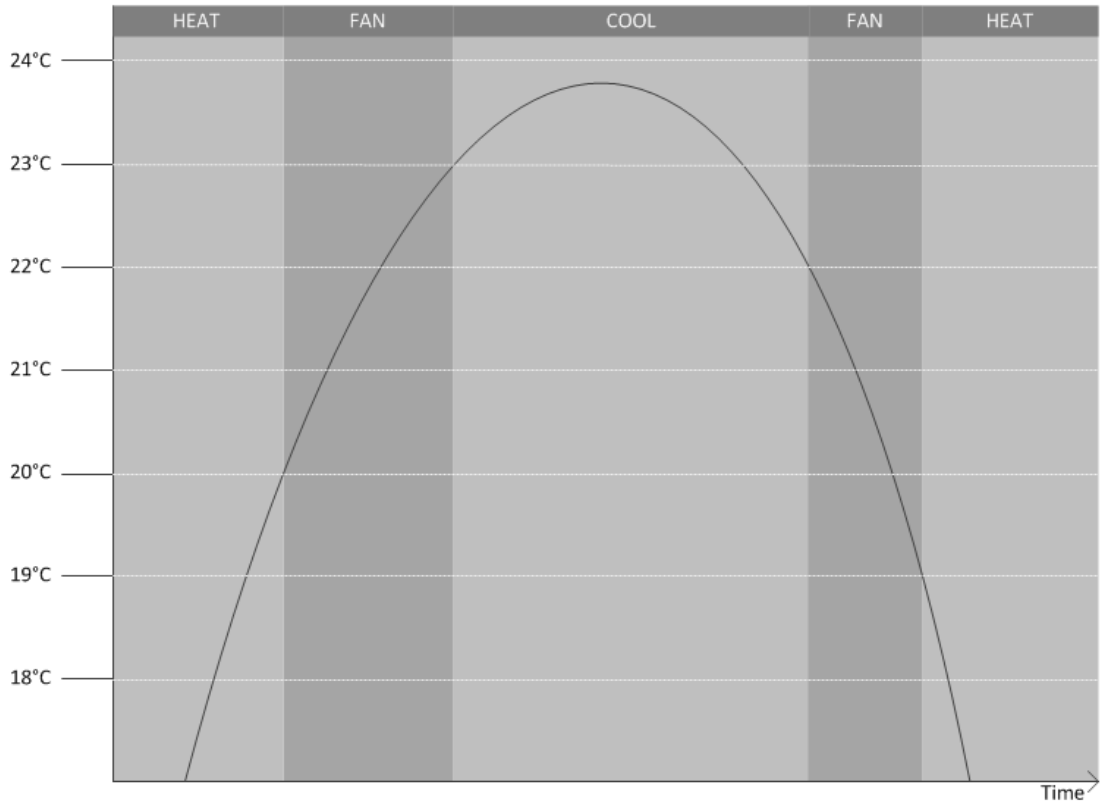
There are two settings, the Heating Setpoint (default 19º) and Cooling Setpoint (default 23ºC). These values can be changed via Modbus, refer to the Air-To-Air Modbus tables for more information.

The Cooling Setpoint must be at least 2ºC greater than the Heating Setpoint, otherwise the default values given above will be assumed.

4.2. Operation

When enabled, the MelcoBEMS MINI (A1M) controls the Mode and Temperature Setpoint based on the Room (return air) Temperature.

While the room temperature is less than the *Heating Setpoint* the unit will be set to HEAT mode with a setpoint of 28ºC.
Whilst in HEAT mode, if the room temperature rises above the *Heating Setpoint + 1ºC* the unit will be set to FAN mode.
Whilst in FAN mode, if the temperature rises above the *Cooling Setpoint* the unit will be set to COOL mode with a setpoint of 19ºC.
Whilst in COOL mode, if the room temperature falls below the *Cooling Setpoint – 1ºC* the unit will be set to FAN mode.
Whilst in FAN mode, if the room temperature falls below the *Heating Setpoint* the unit will be set to HEAT mode with a setpoint of 28ºC.
The following image shows this graphically (assuming a Heating Setpoint of 19ºC and a Cooling Setpoint of 23ºC):



4.3. Initialisation

When the MelcoBEMS MINI (A1M) powers up it will set the mode, which will be determined by the room temperature.

If less than the Heating Setpoint the unit will be set to HEAT mode with a setpoint of 28ºC.
If greater than or equal to the Cooling Setpoint the unit will be set to COOL mode with a setpoint of 19ºC.
If between the Heating and Cooling Setpoints the unit will be set to FAN mode.

5. Setpoint Offset

The Setpoint Offset feature is only applicable to, and will only be enabled for, Air-To-Air type units.

5.1. Settings

There are two settings which are applicable to the Setpoint Offset feature, *BMS Room Temperature* and *BMS Virtual Setpoint*.

The BMS Virtual Setpoint can be changed using Modbus and is stored in non-volatile memory so the value is retained if the MelcoBEMS MINI (A1M) loses power.

The BMS Room Temperature can be changed using Modbus but is not stored in non-volatile memory, so the value is lost and reset to zero upon the MelcoBEMS MINI (A1M) losing power.

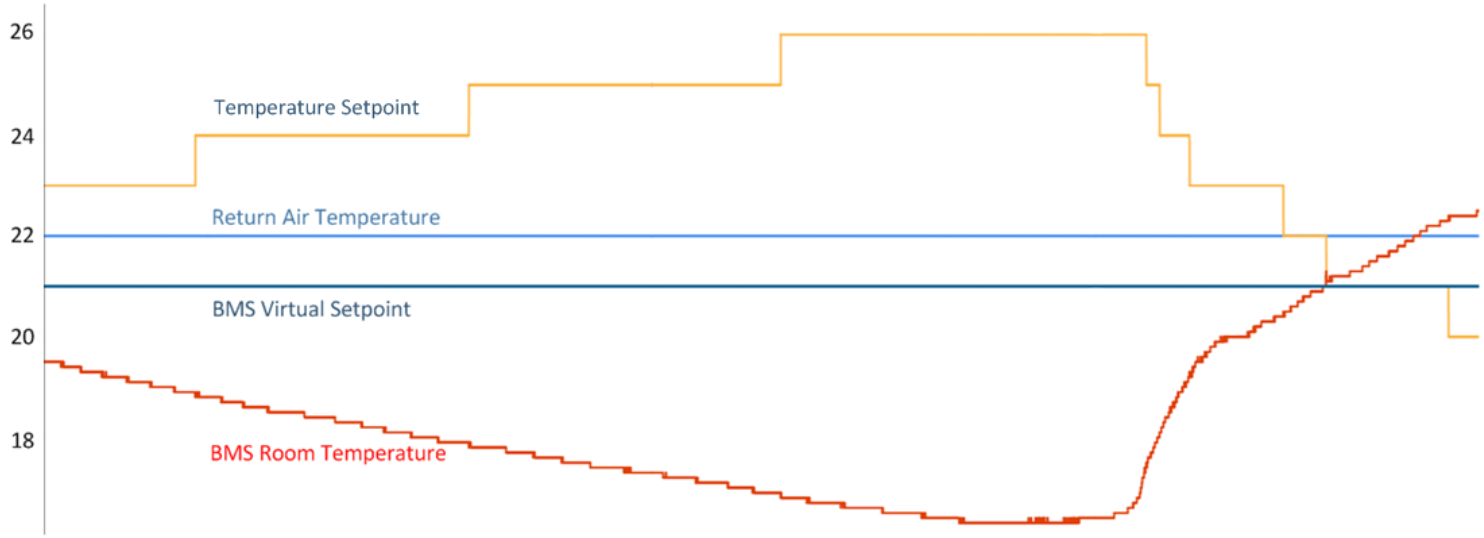
5.2. Operation

In some situations a 3rd party room temperature sensor connected to a BMS or other controller may provide a more accurate temperature reading than the return air temperature of the indoor unit. The A1M can calculate the difference between these two temperature readings and compensate by adjusting the indoor unit's temperature setpoint.

The new temperature setpoint is calculated using the following equation:

Temperature Setpoint = Return Air Temperature – (BMS Room Temperature – BMS Virtual Temperature)

As a hypothetical example, consider the BMS Virtual Setpoint being set to 21ºC and the indoor unit return air temperature remaining constant at 22ºC. As the BMS Room Temperature decreases the MelcoBEMS MINI (A1M) increases the indoor unit's temperature setpoint.
When the BMS Room Temperature reaches 18ºC the Temperature Setpoint = 22 – (18 – 21) = 25ºC.



Hysteresis has been built in to prevent the temperature setpoint from rapidly changing.

The setpoint offset will only operate correctly if the BMS Room Temperature is periodically updated via Modbus, to ensure the MelcoBEMS MINI (A1M) always has an up to date reading.

If the BMS Room Temperature is set to 0ºC (which it will be on power up) the setpoint offset feature will be disabled. It will only activate when the BMS Room Temperature is not 0ºC.
To disable the feature without removing the MelcoBEMS MINI (A1M) power, simply set the BMS Room Temperature to 0ºC.

6. RS-485 termination

An RS-485 termination resistor can be enabled on the MelcoBEMS MINI (A1M) PCB using the single jumper labeled J1.

The jumper setting is summarised below:

Jumper Setting	Description
Not fitted	Termination resistor not enabled
Fitted	Termination resistor enabled

7. Installation

7.1. Physical connection

The MelcoBEMS MINI (A1M) has a 1 metre flying lead to connect directly into the CN105/CN92 connector on the controller PCB. As an example, Figure 2 shows this connection on a Mr Slim indoor unit and a CRHV unit.

7.2. Power supply

The MelcoBEMS MINI (A1M) is powered from the CN105/CN92 connector and hence does not require an external power supply.

7.3. Modbus connections

The MelcoBEMS MINI (A1M) has a 3-way screw terminal to provide Modbus RTU communication via RS-485. Figure 1 shows the RS-485 connections. The Modbus section contains further detail of the Modbus communications.

7.4. Unit type selection

The MelcoBEMS MINI (A1M) software will automatically detect whether an Air-To-Air or Air-To-Water unit is connected. It will then only send commands applicable to that unit type.

8. Status LEDs

There are two status LEDs on the MelcoBEMS MINI (A1M). The LED indications are as follows:

LED Name	Colour	Functionality
AC ACK	Green	Lit when A1M is powered, flashing indicates valid communication with the indoor unit.
RS-485 ACK	Green	Lit when A1M is powered, flashing indicates valid Modbus communication.

8.1. AC ACK

If this LED is permanently lit and does not flash, check the CN105/CN92 connection is secure.

8.2. RS-485 ACK

If this LED is permanently lit and does not flash it could be due to a physical RS-485 connection problem, or incorrect Modbus/RS-485 configuration.

9. BACnet

9.1. BACnet MS/TP

The MelcoBEMS MINI (A1M) can be connected to a BACnet MS/TP network using RS-485.

BACnet protocol can be selected using DIP switch 7 (see section 3.3).

9.2. Object types supported

Property	Object Type				
	Analogue Input	Analogue Output	Binary Input	Binary Output	Multi State Output
Object Identifier	R	R	R	R	R
Object Name	R	R	R	R	R
Object Type	R	R	R	R	R
Present Value	R	R/W	R	R/W	R/W
Status Flags	R	R	R	R	R
Event State	R	R	R	R	R
Out Of Service	R	R	R	R	R
Number Of States					R
State Text					R
Units	R	R			
Polarity			R	R	
Priority Array		R		R	
Relinquish Default		R		R	R

R = Read accessible only
R/W = Read and write accessible

9.3. Object list

The MelcoBEMS MINI (A1M) currently has objects for certain ATA protocol data points, detailed in the following table.

Object type	Object ID	Object name	Notes
Binary Output	BO01	Drive OFF/ON	0 = Drive OFF 1 = Drive ON
Analog Output	AO1	Setpoint	Value in either ºC or ºF, depending on the Temperature Units setting
Analog Output	AO2*	Heating Setpoint	Value in either ºC or ºF, depending on the Temperature Units setting
Analog Output	AO3*	Cooling Setpoint	Value in either ºC or ºF, depending on the Temperature Units setting
Multistate Output	MS4	Mode	1 = Heating 2 = Humidity reduction 3 = Cooling 4 = Ventilation, clean air operation 5 = Auto Operation
Multistate Output	MS5	Fan Speed	1 = Auto 2 = Quiet 3 = Weak 4 = Strong 5 = Very strong (SH i)
Multistate Output	MS6	Air Direction	1 = Auto 2 = Position 1 3 = Position 2 4 = Position 3 5 = Position 4 6 = Position 5 7 = Swing
Multistate Output	MS7**	Temperature Units	1 = ºC 2 = ºF
Analog Input	AI8	Return Air Temperature	Value in either ºC or ºF, depending on the Temperature Units setting
Analog Input	AI9	Fault Code	4-digit fault code

* Deadband mode must be enabled for these objects to have any effect (see section 4).

** Please power cycle the MelcoBEMS MINI after changing the Present Value object property.

10. Modbus connection

10.1. Modbus background

Modbus is a master-slave protocol, which means there are two types of Modbus device, Modbus *Masters* and Modbus *Slaves*.

Slave devices simply wait until they receive a command from a Master, act upon that command and send a reply to the Master. Slaves do not have the ability to send commands to other devices on the bus. Master devices are responsible for sending commands to slave devices and receiving data. Modbus only permits there to be one Master device on the bus at any one time, but up to 247 slaves can be connected at a time.

Modbus is most commonly used over RS-485, which is a hardware standard allowing multiple devices to be connected on the same bus.

Each Slave device must have a unique ID on the bus, which is referred to as a *Slave ID*. Each Modbus command the Master sends will contain this Slave ID and only the Slave with that Slave ID will reply.

10.2. Modbus registers

Modbus Slave devices store data in registers. There are four register types and each type has its own register bank. The register types are summarised below:

Register Name	Register Type	Description
Discrete Input	Digital Input	Read only register used for holding status information which holds a value of 0 or 1.
Coil	Digital Output	Read and write accessible register which holds a value of 0 or 1.
Input Register	Analogue Input	Read only register used for status information which holds a 16-bit value (0-65535)
Holding Register	Analogue Output	Read and write accessible register used for status information which holds a 16-bit value (0-65535)

10.3. Modbus connections

For communication over RS-485 all 3 connections are needed. These are labeled A, B and GND. Please refer to the connection diagrams below.

⚠ **Caution:**

The RS-485 cable must be a shielded data cable. Mains flex or other unshielded cable should not be used. The cable shield should be connected to GND at one end only.

⚠ **Caution:**

RS-485 has polarised data connections. It is crucial that all ‘A’s are connected together, all ‘B’s are connected together and all ‘GND’s are connected together.

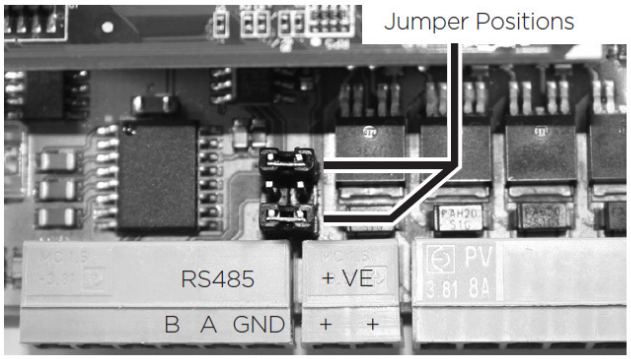
⚠ **Caution:**

The RS-485 cable must be daisy-chained in a bus network. T-junctions (e.g. star network wiring) are not permitted.

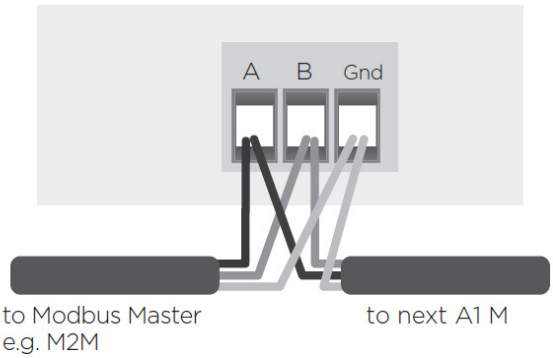
⚠ **Caution:**

RS-485 biasing jumpers must be fitted on the Procon M2M (if used). Please refer to the diagram below.

Procon M2M



Procon A1M



11. Modbus tables – Air-To-Air systems

Some BMS controllers can only read Modbus Holding Registers, so the MelcoBEMS MINI (A1M) also exposes all Discrete, Coil and Input Registers as Holding Registers. The Discrete Input registers and Input registers are not writable so their equivalent Holding Register is read only and marked [**READ ONLY**].

Some BMS controllers may not be able to read signed register values (i.e. values which can be negative in value), so the MelcoBEMS MINI (A1M) also exposes an unsigned version of those registers (these registers will not return a negative value).

11.1. Holding registers

Holding Registers are read using function code 03 and written to using either function code 06 or 16. Function code 06 is used when writing to a single holding register, function code 16 is used for writing to multiple holding registers in the same command.

Holding Registers (Analogue Outputs)			
Register Name	Address	Modicon Address	Details
Drive Mode	0	40001	1 = Heating 2 = Humidity reduction 3 = Cooling 7 = Ventilation, clean air operation 8 = Auto Operation 9 = i-see heating operation* 10 = i-see humidity reduction* 11 = i-see cooling * * indicates a read only value, writing this value will have no effect
Temperature Setpoint	1	40002	Temperature value in °C multiplied by 10. e.g. value 200 = 20°C
Fan Speed	2	40003	0 = Auto 2 = Quiet 3 = Weak 5 = Strong 6 = Very strong (SH i)
Air Direction	3	40004	0 = Auto 1 = Position 1 2 = Position 2 3 = Position 3 4 = Position 4 5 = Position 5 7 = Swing
Modbus Slave ID	4	40005	Modbus- Values 1 – 247 valid
BACnet Station ID			BACnet – Values 1 -127 valid
Modbus RS-485 Baud Rate	5	40006	0 = 9600 1 = 1200 2 = 2400 3 = 4800 4 = 9600 5 = 14400 6 = 19200 7 = 28800 8 = 38400

			9 = 56000 10 = 57600 11 = 115200
BACnet RS-485 Baud Rate			0 = 9600 1 = 19200 2 = 38400 3 = 57600
RS-485 Parity Type	6	40007	0 = None 1 = Even 2 = Odd
Drive On/Off	7	40008	0 = Drive OFF 1 = Drive ON
Room Temperature [**READ ONLY**]	8	40009	Temperature value in °C multiplied by 10. e.g. value 200 = 20°C
Fault Code (hex) [**READ ONLY**]	9	40010	0x8000 = No error 0x6999 = Bad communication with indoor unit (Refer to indoor unit documentation for description of other fault code values)
Firmware Version [**READ ONLY**]	10	40011	A1M firmware version
Modbus Comms Counter [**READ ONLY**]	11	40012	Value of a counter which increments upon every valid Modbus command received. Value is automatically reset to zero when value exceeds 65535.
Fault Code (decimal) [**READ ONLY**]	12	40013	8000 = No error 6999 = Bad communication with indoor unit (Refer to indoor unit documentation for description of other fault code values)
System Type Detected [**READ ONLY**]	13	40014	0 = ATA 1 = ATW
Deadband Enabled State [**READ ONLY**]	14	40015	0 = Deadband disabled (DIP switch 8 OFF) 1 = Deadband enabled (DIP switch 8 ON)
BMS Room Temperature (signed)	15	40016	Signed temperature value in ºC multiplied by 10. 0xFF9C = -10ºC … 0x01F4 = 50ºC
BMS Room Temperature	16	40017	Temperature value in ºC multiplied by 10. 0 = 0ºC … 500 = 50ºC
BMS Virtual Setpoint	17	40018	Temperature value in ºC multiplied by 10. 100 = 10ºC … 400 = 40ºC
Deadband Heating Setpoint	18	40019	Temperature in ºC (default 19ºC). Value must be at least 2ºC lower than the Deadband Cooling Setpoint.
Deadband Cooling Setpoint	19	40020	Temperature in ºC (default 23ºC). Value must be at least 2ºC higher than the Deadband Heating Setpoint.
BACnet Device Instance (most significant 16 bits)	272	40273	Most significant 16 bits of the 32-bit Device Instance
BACnet Device Instance (least significant 16 bits)	273	40274	Least significant 16 bits of the 32-bit Device Instance
BACnet Max Master	274	40275	Maximum number of masters to search for
BACnet Max Info Frames	275	40276	

BACnet APDU Timeout	276	40277	Timeout value in ms for client requests
BACnet APDU Retries	277	40278	Number of times to retry after timeout

11.2. Input registers

Input Registers are read using function code 04.
Note the values of all Input registers have corresponding Holding registers which can be used instead.

Input Registers (Analogue Inputs)			
Register Name	Address	Modicon Address	Details
Room Temperature	0	30001	Temperature value in °C multiplied by 10. e.g. value 200 = 20°C
Fault Code (hex)	1	30002	0x8000 = No error 0x6999 = Bad communication with indoor unit (Refer to indoor unit documentation for description of other fault code values)
Firmware Version	3	30004	MelcoBEMS MINI (A1M) firmware version
Modbus Comms Counter	5	30006	Value of a counter which increments upon every valid Modbus command received. Counter is reset to zero when value exceeds 65535.
Fault Code (decimal)	8	30009	8000 = No error 6999 = Bad communication with indoor unit (Refer to indoor unit documentation for description of other fault code values)
System Type Detected	9	30010	0 = ATA 1 = ATW
Deadband Enabled State	10	30011	0 = Deadband disabled (DIP switch 8 OFF) 1 = Deadband enabled (DIP switch 8 ON)

11.3. Discrete Inputs

There are no Discrete Inputs for Air-To-Air systems.

11.4. Coils

Coils are read using function code 01 and written to using either function code 05 or 15. Function code 05 is used when writing to a single coil register, function code 15 is used for writing to multiple coil registers in the same command.
Note the values of all Coil registers have corresponding Holding registers which can be used instead.

Coils (Digital Outputs)			
Register Name	Address	Modicon Address	Details
Drive On/Off *(Note: Holding register address 7 can also be used to change the Drive)*	0	00001	0 = Drive OFF 1 = Drive ON

Modbus tables – Air-To-Water systems

Some BMS controllers can only read Modbus Holding Registers, so the MelcoBEMS MINI (A1M) also exposes all Discrete, Coil and Input Registers as Holding Registers. The Discrete Input registers and Input registers are not writable so their equivalent Holding Register is read only and marked [**READ ONLY**].

Some BMS controllers may not be able to read signed register values (i.e. values which can be negative in value), so the A1M also exposes an unsigned version of those registers (these registers will not return a negative value).

11.5. Holding registers

Holding Registers are read using function code 03 and written to using either function code 06 or 16. Function code 06 is used when writing to a single holding register, function code 16 is used for writing to multiple holding registers in the same command.

Holding Register (Analogue Output)				Applicable Unit Type						
Register Name	**Addr**	**Modicon Address**	**Details**	**FTC4**	**FTC5**	**CAHV master**	**CAHV slave**	**CRHV master**	**CRHV slave**	
Modbus Slave ID	4	40005	Values 1 – 247 valid	✓	✓	✓	✓	✓	✓	
Modbus RS-485 Baud Rate	5	40006	0 = 9600 1 = 1200 2 = 2400 3 = 4800 4 = 9600 5 = 14400 6 = 19200 7 = 28800 8 = 38400 9 = 56000 10 = 57600 11 = 115200	✓	✓	✓	✓	✓	✓	
RS-485 Parity Type	6	40007	0 = None 1 = Even 2 = Odd	✓	✓	✓	✓	✓	✓	
Fault/Error Code (hex) [**READ ONLY**]	9	40010	0x8000 = No error 0x6999 = Bad communication with unit (Refer to indoor unit documentation for description of other fault code values)	✓	✓	✓		✓		
A1M Firmware Version [**READ ONLY**]	10	40011	A1M firmware version	✓	✓	✓	✓	✓	✓	
Modbus Comms Counter [**READ ONLY**]	11	40012	Value of a counter which increments upon every valid Modbus command received. Counter is reset to zero when value exceeds 65535.	✓	✓	✓	✓	✓	✓	
Fault Code (decimal) [**READ ONLY**]	12	40013	8000 = No error 6999 = Bad communication between A1M and unit (Refer to unit documentation for description of other fault code values)	✓	✓	✓		✓		
System Type Detected [**READ ONLY**]	13	40014	0 = A1M has detected an ATA unit connected 1 = A1M has detected an ATW system connected	✓	✓	✓	✓	✓	✓	
System On/Off	25	40026	0 = System OFF 1 = System ON 2 = Emergency Run (read only value) 3 = Test Run (read only value)	✓	✓	✓		✓		
Operating Mode	26	40027	0 = Stop 1 = Hot Water 2 = Heating 3 = Cooling			✓#4		✓#5		

			5 = Freeze Stat 6 = Legionella 7 = Heating-Eco							
Operating Mode (DHW)	27	40028	0 = Normal 1 = Eco		✓					
A/C Mode – Zone 1	28	40029	0 = Heating Room Temp 1 = Heating Flow Temp 2 = Heating Heat Curve 3 = Cooling Room Temp (not on 13K model) 4 = Cooling Flow Temp 5 = Floor Dryup	✓	✓					
A/C Mode – Zone 2	29	40030	0 = Heating Room Temp 1 = Heating Flow Temp 2 = Heating Heat Curve 3 = Cooling Room Temp (not on 13K model) 4 = Cooling Flow Temp 5 = Floor Dryup	✓	✓					
Set Tank Water Temperature (signed)	30	40031	Temperature value in ºC multiplied by 100. (see note *)	✓#6	✓					
Set Tank Water Temperature	31	40032	Temperature value in ºC multiplied by 100. (see note **)	✓#6	✓					
H/C Thermostat Target Temperature – Zone 1 (signed)	32	40033	Temperature value in ºC multiplied by 100. (see note *)	✓	✓					
H/C Thermostat Target Temperature – Zone 1	33	40034	Temperature value in ºC multiplied by 100. (see note **)	✓	✓					
H/C Thermostat Target Temperature – Zone 2 (signed)	34	40035	Temperature value in ºC multiplied by 100. (see note *)	✓	✓					
H/C Thermostat Target Temperature – Zone 2	35	40036	Temperature value in ºC multiplied by 100. (see note **)	✓	✓					
MRC Prohibit	36	40037	Bit packed value: Bit 0 – System On/Off (0 = ON, 1 = Prohibit) Bit 1 – Running Mode (0 = ON, 1 = Prohibit) Bit 2 – Setting Temp (0 = ON, 1 = Prohibit) Bit 3 – Undefined (always 0) Bit 4 – Function Setting (0 = Normal, 1 = Function Setting) Bits 5, 6 and 7 – Undefined (always 0) (Before using this register see note ††)	✓	✓	✓#7		✓#7		
Force DHW	37	40038	0 = Normal 1 = Force DHW	✓	✓					
Holiday	38	40039	0 = Normal 1 = Holiday	✓	✓					
DHW On Prohibit	39	40040	0 = On 1 = Prohibit	✓#6	✓					
Heating On Prohibit – Zone 1	40	40041	0 = On 1 = Prohibit	✓#6	✓					
Cooling On Prohibit – Zone 1	41	40042	0 = On 1 = Prohibit	✓#6	✓					
Heating On Prohibit – Zone 2	42	40043	0 = On 1 = Prohibit	✓#6	✓					
Cooling On Prohibit – Zone 2	43	40044	0 = On 1 = Prohibit		✓					
Unused	44	40045	Value 0 always returned							
Capacity Mode	45	40046	0 = COP priority 1 = Capacity priority			✓#8		✓#8		
Capacity Control Ratio	46	40047	Value in %. 0 = 0% ... 100 = 100%			✓		✓		
Fan Mode	47	40048	0 = Ordinary 1 = Coercion			✓				

Current Hour	48	40049	0 … 23			✓	✓	✓	✓	
Current Minute	49	40050	0 … 59			✓	✓	✓	✓	
Outdoor Temperature By BMS (signed)	50	40051	Temperature value in ºC multiplied by 10. 0xFE70 = -40ºC … 0x036B = 87.5ºC			✓#9		✓#9		
Outdoor Temperature By BMS	51	40052	Temperature value in ºC multiplied by 10. 0x0000 = 0.0ºC ... 0x036B = 87.5ºC.			✓ #10		✓ #10		
Setting Water Temperature (signed)	52	40053	Temperature value in ºC multiplied by 100. (see note *)			✓ #11		✓ #12		
Setting Water Temperature	53	40054	Temperature value in ºC multiplied by 100. (see note **)			✓ #11		✓ #12		
Thermostat Target Temperature – Zone 1 (signed)	54	40055	Temperature value in ºC multiplied by 100. (see note *)	✓	✓					
Thermostat Target Temperature – Zone 1	55	40056	Temperature value in ºC multiplied by 100. (see note **)	✓	✓					
Thermostat Target Temperature – Zone 2 (signed)	56	40057	Temperature value in ºC multiplied by 100. (see note *)	✓	✓					
Thermostat Target Temperature – Zone 2	57	40058	Temperature value in ºC multiplied by 100. (see note **)	✓	✓					
HC Control Type	58	40059	0 = Heating 1 = Cooling	✓	✓					
Own Refrigerant Address **[READ ONLY]**	66	40067	0 … 32	✓	✓					
Defrost **[READ ONLY]**	67	40068	0 = Normal 1 = Standby 2 = Defrost 3 = Waiting Restart	✓	✓	✓				
Residual Heat Removal **[READ ONLY]**	68	40069	0 = Normal 1 = Prepared 2 = Residual Heat Removal	✓	✓					
Refrigerant Error Info [**READ ONLY**]	69	40070	0 = Normal 1 = Error (System) 2 = Error (Startup) 3 = Maintenance Error	✓	✓	✓		✓		
7-Segment Display Error Code Digit 1 [**READ ONLY**]	70	40071	(see note ^)	✓	✓					
7-Segment Display Error Code Digit 2 **[READ ONLY]**	71	40072	(see note ^^)	✓	✓					
Status Of Heating **[READ ONLY]**	72	40073	0 = No type 1 = Heating C1 2 = Heating C2 3 = Heating C3	✓						
			0 = No type 1 = Heating/Cooling A1, Heating/Cooling B1, Heating/Cooling C1 2 = Heating/Cooling A2, Heating/Cooling B2, Heating/Cooling C2 3 = Heating/Cooling A3, Heating/Cooling B3, Heating/Cooling C3		✓					
Heat Pump Frequency – Master **[READ ONLY]**	73	40074	Frequency value in Hz 0 = 0Hz … 255 = 255Hz	✓	✓	✓		✓		
Heat Pump Frequency – Slave 1 **[READ ONLY]**	74	40075	Frequency value in Hz 0 = 0Hz … 255 = 255Hz	✓	✓	✓		✓		
Heat Pump Frequency – Slave 2 **[READ ONLY]**	75	40076	Frequency value in Hz 0 = 0Hz … 255 = 255Hz	✓	✓	✓		✓		
Heat Pump Frequency – Slave 3 **[READ ONLY]**	76	40077	Frequency value in Hz 0 = 0Hz … 255 = 255Hz	✓	✓	✓		✓		
Heat Pump Frequency – Slave 4 **[READ ONLY]**	77	40078	Frequency value in Hz 0 = 0Hz … 255 = 255Hz	✓	✓	✓		✓		

Heat Pump Frequency – Slave 5 **[READ ONLY]**	78	40079	Frequency value in Hz 0 = 0Hz … 255 = 255Hz	✓	✓	✓		✓		
Heat Pump Frequency – Slave 6 **[READ ONLY]**	79	40080	Frequency value in Hz 0 = 0Hz … 255 = 255Hz	✓	✓	✓		✓		
Heat Source Status **[READ ONLY]**	80	40081	0 = H/P 1 = IH 2 = BH 3 = IH + BH 4 = Boiler	✓	✓					
Temperature Setpoint – Zone 1 (signed) **[READ ONLY]**	81	40082	Temperature value in ºC multiplied by 100. (see note *)	✓	✓					
Temperature Setpoint – Zone 1 **[READ ONLY]**	82	40083	Temperature value in ºC multiplied by 100. (see note **)	✓	✓					
Temperature Setpoint – Zone 2 (signed) **[READ ONLY]**	83	40084	Temperature value in ºC multiplied by 100. (see note *)	✓	✓					
Temperature Setpoint – Zone 2 **[READ ONLY]**	84	40085	Temperature value in ºC multiplied by 100. (see note **)	✓	✓					
Flow Temperature Setpoint – Zone 1 (signed) **[READ ONLY]**	85	40086	Temperature value in ºC multiplied by 100. (see note *)	✓	✓	✓		✓		
Flow Temperature Setpoint – Zone 1 **[READ ONLY]**	86	40087	Temperature value in ºC multiplied by 100. (see note **)	✓	✓	✓		✓		
Flow Temperature Setpoint – Zone 2 (signed) **[READ ONLY]**	87	40088	Temperature value in ºC multiplied by 100. (see note *)	✓	✓					
Flow Temperature Setpoint – Zone 2 **[READ ONLY]**	88	40089	Temperature value in ºC multiplied by 100. (see note **)	✓	✓					
Legionella Temperature Setpoint (signed) **[READ ONLY]**	89	40090	Temperature value in ºC multiplied by 100. (see note *)	✓	✓					
Legionella Temperature Setpoint **[READ ONLY]**	90	40091	Temperature value in ºC multiplied by 100. (see note **)	✓	✓					
DHW Temperature Drop (signed) **[READ ONLY]**	91	40092	Temperature value in ºC multiplied by 10. 0xFF38 = -20.0ºC … 0x0433 = 107.5ºC	✓	✓					
DHW Temperature Drop **[READ ONLY]**	92	40093	Temperature value in ºC multiplied by 10. 0x0000 = 0ºC … 0x0433 = 107.5ºC 0 = 0.0ºC … 1075 = 107.5ºC	✓	✓					
Room Temperature – Zone 1 (signed) **[READ ONLY]**	93	40094	Temperature value in ºC multiplied by 100. (see note *)	✓	✓					
Room Temperature – Zone 1 **[READ ONLY]**	94	40095	Temperature value in ºC multiplied by 100. (see note **)	✓	✓					
Room Temperature – Zone 2 (signed) **[READ ONLY]**	95	40096	Temperature value in ºC multiplied by 100. (see note *)	✓	✓					
Room Temperature – Zone 2 **[READ ONLY]**	96	40097	Temperature value in ºC multiplied by 100. (see note **)	✓	✓					
Refrigerant Liquid Temperature (signed) **[READ ONLY]**	97	40098	Temperature value in ºC multiplied by 100. (see note *)	✓	✓					
Refrigerant Liquid Temperature **[READ ONLY]**	98	40099	Temperature value in ºC multiplied by 100. (see note **)	✓	✓					
Outdoor Ambient Temperature (signed) **[READ ONLY]**	99	40100	Temperature value in ºC multiplied by 10. 0xFE70 = -40.0ºC … 0x036B = 87.5ºC	✓	✓	✓	✓			
Outdoor Ambient Temperature **[READ ONLY]**	100	40101	Temperature value in ºC multiplied by 10. 0x0000 = 0.0ºC ... 0x036B = 87.5ºC.	✓	✓	✓	✓			
Flow Temperature (signed) **[READ ONLY]**	101	40102	Temperature value in ºC multiplied by 100. (see note *)	✓	✓					
Water Outlet Temperature (signed) **[READ ONLY]**			Temperature value in ºC multiplied by 100. (see note *)			✓	✓	✓	✓	

Flow Temperature **[READ ONLY]**	102	40103	Temperature value in ºC multiplied by 100. (see note **)	✓	✓					
Water Outlet Temperature **[READ ONLY]**			Temperature value in ºC multiplied by 100. (see note **)			✓	✓	✓	✓	
Return Temperature (signed) **[READ ONLY]**	103	40104	Temperature value in ºC multiplied by 100. (see note *)	✓	✓					
Water Inlet Temperature (signed) **[READ ONLY]**			Temperature value in ºC multiplied by 100. (see note *)			✓	✓	✓	✓	
Return Temperature **[READ ONLY]**	104	40105	Temperature value in ºC multiplied by 100. (see note **)	✓	✓					
Water Inlet Temperature **[READ ONLY]**			Temperature value in ºC multiplied by 100. (see note **)			✓	✓	✓	✓	
Tank Water Temperature (signed) **[READ ONLY]**	105	40106	Temperature value in ºC multiplied by 100. (see note *)	✓	✓					
Tank Water Temperature **[READ ONLY]**	106	40107	Temperature value in ºC multiplied by 100. (see note **)	✓	✓					
Flow Temperature – Zone 1 (signed) **[READ ONLY]**	107	40108	Temperature value in ºC multiplied by 100. (see note *)	✓	✓					
External Water Temperature 1 (signed) **[READ ONLY]**			Temperature value in ºC multiplied by 100. (see note *)			✓		✓		
Flow Temperature – Zone 1 **[READ ONLY]**	108	40109	Temperature value in ºC multiplied by 100. (see note **)	✓	✓					
External Water Temperature 1 **[READ ONLY]**			Temperature value in ºC multiplied by 100. (see note **)			✓		✓		
Return Temperature – Zone 1 (signed) **[READ ONLY]**	109	40110	Temperature value in ºC multiplied by 100. (see note *)	✓	✓					
Return Temperature – Zone 1 **[READ ONLY]**	110	40111	Temperature value in ºC multiplied by 100. (see note **)	✓	✓					
Flow Temperature – Zone 2 (signed) **[READ ONLY]**	111	40112	Temperature value in ºC multiplied by 100. (see note *)	✓	✓					
External Water Temperature 2 (signed) **[READ ONLY]**			Temperature value in ºC multiplied by 100. (see note *)			✓		✓		
Flow Temperature – Zone 2 **[READ ONLY]**	112	40113	Temperature value in ºC multiplied by 100. (see note **)	✓	✓					
External Water Temperature 2 **[READ ONLY]**			Temperature value in ºC multiplied by 100. (see note **)			✓		✓		
Return Temperature – Zone 2 (signed) **[READ ONLY]**	113	40114	Temperature value in ºC multiplied by 100. (see note *)	✓	✓					
Return Temperature – Zone 2 **[READ ONLY]**	114	40115	Temperature value in ºC multiplied by 100. (see note **)	✓	✓					
Boiler Flow Temperature (signed) **[READ ONLY]**	115	40116	Temperature value in ºC multiplied by 100. (see note *)	✓	✓					
Boiler Flow Temperature **[READ ONLY]**	116	40117	Temperature value in ºC multiplied by 100. (see note **)	✓	✓					
Boiler Return Temperature (signed) **[READ ONLY]**	117	40118	Temperature value in ºC multiplied by 100. (see note *)	✓	✓					
Boiler Return Temperature **[READ ONLY]**	118	40119	Temperature value in ºC multiplied by 100. (see note **)	✓	✓					
Room Thermo 1 (IN1) **[READ ONLY]**	119	40120	0 = OFF, 1 = ON	✓	✓					
Room Thermo 2 (IN6) **[READ ONLY]**	120	40121	0 = OFF, 1 = ON	✓	✓					

Flow SW1 (IN2) **[READ ONLY]**	121	40122	0 = OFF, 1 = ON	✓	✓					
Flow SW2 (IN3) **[READ ONLY]**	122	40123	0 = OFF, 1 = ON	✓	✓					
Flow SW3 (IN7) **[READ ONLY]**	123	40124	0 = OFF, 1 = ON	✓	✓					
Demand (IN4) **[READ ONLY]**	124	40125	0 = OFF, 1 = ON	✓	✓					
Outdoor Thermo (IN5) **[READ ONLY]**	125	40126	0 = OFF, 1 = ON	✓	✓					
DIP Switch SW2 **[READ ONLY]**	126	40127	Bit 0 = Switch 2-1 (0 = OFF, 1 = ON) … Bit 9 = Switch 2-10 (0 = OFF, 1 = ON)	✓	✓					
Heat Pump Master ON/OFF **[READ ONLY]**	127	40128	0 = Stop, 1 = Run	✓	✓	✓		✓		
Heat Pump Slave 1 ON/OFF (address 2 for CAHV/CRHV) **[READ ONLY]**	128	40129	0 = Stop, 1 = Run	✓	✓	✓		✓		
Heat Pump Slave 2 ON/OFF (address 3 for CAHV/CRHV) **[READ ONLY]**	129	40130	0 = Stop, 1 = Run	✓	✓	✓		✓		
Heat Pump Slave 3 ON/OFF (address 4 for CAHV/CRHV) **[READ ONLY]**	130	40131	0 = Stop, 1 = Run	✓	✓	✓		✓		
Heat Pump Slave 4 ON/OFF (address 5 for CAHV/CRHV) **[READ ONLY]**	131	40132	0 = Stop, 1 = Run	✓	✓	✓		✓		
Heat Pump Slave 5 ON/OFF (address 6 for CAHV/CRHV) **[READ ONLY]**	132	40133	0 = Stop, 1 = Run	✓	✓	✓		✓		
Heat Pump Slave 6 ON/OFF (address 7 for CAHV/CRHV) **[READ ONLY]**	133	40134	0 = Stop, 1 = Run	✓	✓	✓		✓		
Heat Pump Slave 7 ON/OFF (address 8 for CAHV/CRHV) **[READ ONLY]**	134	40135	0 = Stop, 1 = Run			✓		✓		
Heat Pump Slave 8 ON/OFF (address 9 for CAHV/CRHV) **[READ ONLY]**	135	40136	0 = Stop, 1 = Run			✓		✓		
Heat Pump Run Time (hours) **[READ ONLY]**	136	40137	Value in hours 0 = 0 Hours … 99 = 99 Hours	✓	✓	✓		✓		
Heat Pump Run Time (hours x100) **[READ ONLY]**	137	40138	Value in hours multiplied by 100 0 = 0 hours … 65535 = 6553500 hours	✓	✓	✓		✓		
Heat Pump Refrigerant Address 1 Run Time (hours x100) **[READ ONLY]**	138	40139	Value in hours multiplied by 100 0 = 0 hours … 65535 = 6553500 hours	✓	✓					
Heat Pump Refrigerant Address 2 Run Time (hours x100) **[READ ONLY]**	139	40140	Value in hours multiplied by 100 0 = 0 hours … 65535 = 6553500 hours	✓	✓					
Heat Pump Refrigerant Address 3 Run Time (hours x100) **[READ ONLY]**	140	40141	Value in hours multiplied by 100 0 = 0 hours … 65535 = 6553500 hours	✓	✓					
Heat Pump Refrigerant Address 4 Run Time (hours x100) **[READ ONLY]**	141	40142	Value in hours multiplied by 100 0 = 0 hours … 65535 = 6553500 hours	✓	✓					
Heat Pump Refrigerant Address 5 Run Time (hours x100) **[READ ONLY]**	142	40143	Value in hours multiplied by 100 0 = 0 hours … 65535 = 6553500 hours	✓	✓					
Heat Pump Refrigerant Address 6 Run Time (hours x100) **[READ ONLY]**	143	40144	Value in hours multiplied by 100 0 = 0 hours … 65535 = 6553500 hours	✓	✓					

Boiler ON/OFF **[READ ONLY]**	144	40145	0 = Stop, 1 = Run	✓	✓					
External Heater Operation 1 **[READ ONLY]**			0 = Stop, 1 = Run			✓		✓		
Booster Heater 1 ON/OFF **[READ ONLY]**	145	40146	0 = Stop, 1 = Run	✓	✓					
Booster Heater 2 ON/OFF **[READ ONLY]**	146	40147	0 = Stop, 1 = Run	✓	✓					
Booster Heater 2+ ON/OFF **[READ ONLY]**	147	40148	0 = Stop, 1 = Run	✓	✓					
Immersion Heater ON/OFF **[READ ONLY]**	148	40149	0 = Stop, 1 = Run	✓	✓					
Water Pump 1 ON/OFF **[READ ONLY]**	149	40150	0 = Stop, 1 = Run	✓	✓	✓		✓		
Water Pump 2 ON/OFF **[READ ONLY]**	150	40151	0 = Stop, 1 = Run	✓	✓	✓		✓		
Water Pump 3 ON/OFF **[READ ONLY]**	151	40152	0 = Stop, 1 = Run	✓	✓	✓		✓		
3-Way Valve ON/OFF **[READ ONLY]**	152	40153	0 = Stop, 1 = Run	✓	✓					
2-Way Valve 2 ON/OFF **[READ ONLY]**	153	40154	0 = Stop, 1 = Run	✓	✓					
Mixing Valve Step **[READ ONLY]**	154	40155	0 = Step 0 … 10 = Step 10	✓	✓					
Refrigerant 1 Error Code Digit 1 **[READ ONLY]**	155	40156	(see note ^)	✓	✓					
Refrigerant 1 Error Code Digit 2 **[READ ONLY]**	156	40157	(see note ^^)	✓	✓					
Refrigerant 2 Error Code Digit 1 **[READ ONLY]**	157	40158	(see note ^)	✓	✓					
Refrigerant 2 Error Code Digit 2 **[READ ONLY]**	158	40159	(see note ^^)	✓	✓					
Refrigerant 3 Error Code Digit 1 **[READ ONLY]**	159	40160	(see note ^)	✓	✓					
Refrigerant 3 Error Code Digit 2 **[READ ONLY]**	160	40161	(see note ^^)	✓	✓					
Refrigerant 4 Error Code Digit 1 **[READ ONLY]**	161	40162	(see note ^)	✓	✓					
Refrigerant 4 Error Code Digit 2 **[READ ONLY]**	162	40163	(see note ^^)	✓	✓					
Refrigerant 5 Error Code Digit 1 **[READ ONLY]**	163	40164	(see note ^)	✓	✓					
Refrigerant 5 Error Code Digit 2 **[READ ONLY]**	164	40165	(see note ^^)	✓	✓					
Refrigerant 6 Error Code Digit 1 **[READ ONLY]**	165	40166	(see note ^)	✓	✓					
Refrigerant 6 Error Code Digit 2 **[READ ONLY]**	166	40167	(see note ^^)	✓	✓					
Heat Pump Frequency – Slave 7 **[READ ONLY]**	167	40168	Frequency value in Hz 0 = 0Hz … 255 = 255Hz			✓		✓		
Heat Pump Frequency – Slave 8 **[READ ONLY]**	168	40169	Frequency value in Hz 0 = 0Hz … 255 = 255Hz			✓		✓		
Heat Pump Frequency – Slave 9 **[READ ONLY]**	169	40170	Frequency value in Hz 0 = 0Hz … 255 = 255Hz			✓		✓		

Heat Pump Frequency – Slave 10 **[READ ONLY]**	170	40171	Frequency value in Hz 0 = 0Hz … 255 = 255Hz			✓		✓		
Heat Pump Frequency – Slave 11 **[READ ONLY]**	171	40172	Frequency value in Hz 0 = 0Hz … 255 = 255Hz			✓		✓		
Heat Pump Frequency – Slave 12 **[READ ONLY]**	172	40173	Frequency value in Hz 0 = 0Hz … 255 = 255Hz			✓		✓		
Heat Pump Frequency – Slave 13 **[READ ONLY]**	173	40174	Frequency value in Hz 0 = 0Hz … 255 = 255Hz			✓		✓		
Heat Pump Frequency – Slave 14 **[READ ONLY]**	174	40175	Frequency value in Hz 0 = 0Hz … 255 = 255Hz			✓		✓		
Heat Pump Frequency – Slave 15 **[READ ONLY]**	175	40176	Frequency value in Hz 0 = 0Hz … 255 = 255Hz			✓		✓		
Heat Pump 10 ON/OFF **[READ ONLY]**	176	40177	0 = Stop, 1 = Run			✓		✓		
Heat Pump 11 ON/OFF **[READ ONLY]**	177	40178	0 = Stop, 1 = Run			✓		✓		
Heat Pump 12 ON/OFF **[READ ONLY]**	178	40179	0 = Stop, 1 = Run			✓		✓		
Heat Pump 13 ON/OFF **[READ ONLY]**	179	40180	0 = Stop, 1 = Run			✓		✓		
Heat Pump 14 ON/OFF **[READ ONLY]**	180	40181	0 = Stop, 1 = Run			✓		✓		
Heat Pump 15 ON/OFF **[READ ONLY]**	181	40182	0 = Stop, 1 = Run			✓		✓		
Heat Pump 16 ON/OFF **[READ ONLY]**	182	40183	0 = Stop, 1 = Run			✓		✓		
Heat Pump 17 ON/OFF **[READ ONLY]**	183	40184	0 = Stop, 1 = Run			✓		✓		
Heat Pump 18 ON/OFF **[READ ONLY]**	184	40185	0 = Stop, 1 = Run			✓#1		✓#1		
Heat Pump 19 ON/OFF **[READ ONLY]**	185	40186	0 = Stop, 1 = Run			✓#1		✓#1		
Heat Pump 20 ON/OFF **[READ ONLY]**	186	40187	0 = Stop, 1 = Run			✓#1		✓#1		
Heat Pump 21 ON/OFF **[READ ONLY]**	187	40188	0 = Stop, 1 = Run			✓#1		✓#1		
Heat Pump 22 ON/OFF **[READ ONLY]**	188	40189	0 = Stop, 1 = Run			✓#1		✓#1		
Heat Pump 23 ON/OFF **[READ ONLY]**	189	40190	0 = Stop, 1 = Run			✓#1		✓#1		
Heat Pump 24 ON/OFF **[READ ONLY]**	190	40191	0 = Stop, 1 = Run			✓#1		✓#1		
Heat Pump 25 ON/OFF **[READ ONLY]**	191	40192	0 = Stop, 1 = Run			✓#1		✓#1		
Heat Pump 26 ON/OFF **[READ ONLY]**	192	40193	0 = Stop, 1 = Run			✓#1		✓#1		
Heat Pump 27 ON/OFF **[READ ONLY]**	193	40194	0 = Stop, 1 = Run			✓#1		✓#1		
Heat Pump 28 ON/OFF **[READ ONLY]**	194	40195	0 = Stop, 1 = Run			✓#1		✓#1		
Heat Pump 29 ON/OFF **[READ ONLY]**	195	40196	0 = Stop, 1 = Run			✓#1		✓#1		

Heat Pump 30 ON/OFF **[READ ONLY]**	196	40197	0 = Stop, 1 = Run			✓#1		✓#1		
Heat Pump 31 ON/OFF **[READ ONLY]**	197	40198	0 = Stop, 1 = Run			✓#1		✓#1		
Heat Pump 32 ON/OFF **[READ ONLY]**	198	40199	0 = Stop, 1 = Run			✓#1		✓#1		
	199 - 214	40200 - 40215	Reserved							
External Heater ON/OFF **[READ ONLY]**	215	40216	0 = Stop, 1 = Run			✓		✓#1		
Water Pump 4 ON/OFF **[READ ONLY]**	216	40217	0 = Stop, 1 = Run			✓		✓		
Water Pump 5 ON/OFF **[READ ONLY]**	217	40218	0 = Stop, 1 = Run			✓		✓		
Water Pump 6 ON/OFF **[READ ONLY]**	218	40219	0 = Stop, 1 = Run			✓		✓		
Water Pump 7 ON/OFF **[READ ONLY]**	219	40220	0 = Stop, 1 = Run			✓		✓		
Water Pump 8 ON/OFF **[READ ONLY]**	220	40221	0 = Stop, 1 = Run			✓		✓		
Water Pump 9 ON/OFF **[READ ONLY]**	221	40222	0 = Stop, 1 = Run			✓		✓		
Water Pump 10 ON/OFF **[READ ONLY]**	222	40223	0 = Stop, 1 = Run			✓		✓		
Water Pump 11 ON/OFF **[READ ONLY]**	223	40224	0 = Stop, 1 = Run			✓		✓		
Water Pump 12 ON/OFF **[READ ONLY]**	224	40225	0 = Stop, 1 = Run			✓		✓		
Water Pump 13 ON/OFF **[READ ONLY]**	225	40226	0 = Stop, 1 = Run			✓		✓		
Water Pump 14 ON/OFF **[READ ONLY]**	226	40227	0 = Stop, 1 = Run			✓		✓		
Water Pump 15 ON/OFF **[READ ONLY]**	227	40228	0 = Stop, 1 = Run			✓		✓		
Water Pump 16 ON/OFF **[READ ONLY]**	228	40229	0 = Stop, 1 = Run			✓		✓		
Drain Pan Heater ON/OFF **[READ ONLY]**	229	40230	0 = Stop, 1 = Run			✓	✓			
Evaporating Temperature (signed) **[READ ONLY]**	230	40231	Temperature value in ºC multiplied by 100. (see note *)			✓		✓		
Evaporating Temperature **[READ ONLY]**	231	40232	Temperature value in ºC multiplied by 100. (see note **)			✓		✓		
Condensing Temperature (signed) **[READ ONLY]**	232	40233	Temperature value in ºC multiplied by 100. (see note *)			✓		✓		
Condensing Temperature **[READ ONLY]**	233	40234	Temperature value in ºC multiplied by 100. (see note **)			✓		✓		
Electric Energy 1 **[READ ONLY]**	234	40235	Electric Energy in kWh multiplied by 100 (see note †)			✓#1	✓#1	✓#1	✓#1	
Electric Energy 2 **[READ ONLY]**	235	40236	Electric Energy in kWh multiplied by 100 (see note †)			✓#1	✓#1	✓#1	✓#1	
Electric Energy 3 **[READ ONLY]**	236	40237	Electric Energy in kWh multiplied by 100 (see note †)			✓#1	✓#1	✓#1	✓#1	

Electric Energy 4 **[READ ONLY]**	237	40238	Electric Energy in kWh multiplied by 100 (see note †)			✓#1	✓#1	✓#1	✓#1	
Electric Energy 5 **[READ ONLY]**	238	40239	Electric Energy in kWh multiplied by 100 (see note †)			✓#1	✓#1	✓#1	✓#1	
Electric Energy 6 **[READ ONLY]**	239	40240	Electric Energy in kWh multiplied by 100 (see note †)			✓#1	✓#1	✓#1	✓#1	
Electric Energy 7 **[READ ONLY]**	240	40241	Electric Energy in kWh multiplied by 100 (see note †)			✓#1	✓#1	✓#1	✓#1	
Electric Energy 8 **[READ ONLY]**	241	40242	Electric Energy in kWh multiplied by 100 (see note †)			✓#1	✓#1	✓#1	✓#1	
Electric Energy 9 **[READ ONLY]**	242	40243	Electric Energy in kWh multiplied by 100 (see note †)			✓#1	✓#1	✓#1	✓#1	
Electric Energy 10 **[READ ONLY]**	243	40244	Electric Energy in kWh multiplied by 100 (see note †)			✓#1	✓#1	✓#1	✓#1	
Electric Energy 11 **[READ ONLY]**	244	40245	Electric Energy in kWh multiplied by 100 (see note †)			✓#1	✓#1	✓#1	✓#1	
Electric Energy 12 **[READ ONLY]**	245	40246	Electric Energy in kWh multiplied by 100 (see note †)			✓#1	✓#1	✓#1	✓#1	
Electric Energy 13 **[READ ONLY]**	246	40247	Electric Energy in kWh multiplied by 100 (see note †)			✓#1	✓#1	✓#1	✓#1	
Electric Energy 14 **[READ ONLY]**	247	40248	Electric Energy in kWh multiplied by 100 (see note †)			✓#1	✓#1	✓#1	✓#1	
Electric Energy 15 **[READ ONLY]**	248	40249	Electric Energy in kWh multiplied by 100 (see note †)			✓#1	✓#1	✓#1	✓#1	
Electric Energy 16 **[READ ONLY]**	249	40250	Electric Energy in kWh multiplied by 100 (see note †)			✓#1	✓#1	✓#1	✓#1	
Brine Inlet Temperature (signed) **[READ ONLY]**	250	40251	Temperature value in ºC multiplied by 100. (see note *)					✓	✓	
Brine Inlet Temperature **[READ ONLY]**	251	40252	Temperature value in ºC multiplied by 100. (see note **)					✓	✓	
Brine Outlet Temperature 1 (signed) **[READ ONLY]**	252	40253	Temperature value in ºC multiplied by 100. (see note *)					✓	✓	
Brine Outlet Temperature 1 **[READ ONLY]**	253	40254	Temperature value in ºC multiplied by 100. (see note **)					✓	✓	
Brine Outlet Temperature 2 (signed) **[READ ONLY]**	254	40255	Temperature value in ºC multiplied by 100. (see note *)					✓	✓	
Brine Outlet Temperature 2 **[READ ONLY]**	255	40256	Temperature value in ºC multiplied by 100. (see note **)					✓	✓	
Condensing Temperature 2 (signed) **[READ ONLY]**	256	40257	Temperature value in ºC multiplied by 100. (see note *)					✓	✓	
Condensing Temperature 2 **[READ ONLY]**	257	40258	Temperature value in ºC multiplied by 100. (see note **)					✓	✓	
Water Outlet Temperature 2 (signed) **[READ ONLY]**	258	40259	Temperature value in ºC multiplied by 100. (see note *)					✓	✓	
Water Outlet Temperature 2 **[READ ONLY]**	259	40260	Temperature value in ºC multiplied by 100. (see note **)					✓	✓	
Evaporating Temperature 2 (signed) **[READ ONLY]**	260	40261	Temperature value in ºC multiplied by 100. (see note *)					✓	✓	
Evaporating Temperature 2 **[READ ONLY]**	261	40262	Temperature value in ºC multiplied by 100. (see note **)					✓	✓	
Water Pump 1 – PWM Duty **[READ ONLY]**	262	40263	Duty value in % 0 = 0% … 100 = 100%			✓	✓	✓#1	✓#1	

Water Pump 1 – PWM Duty Feedback **[READ ONLY]**	263	40264	Duty value in % 0 = 0% … 100 = 100%			✓#1	✓#1	✓#1	✓#1	
3-Way Valve 1 **[READ ONLY]**	264	40265	0 = OFF (stop) 1 = ON (run)			✓		✓		
Version of Protocol (upper) **[READ ONLY]**	265	40266	Version of Protocol is a value in BCD e.g. V3.01 = 3 (upper) and 1 (lower)	✓	✓	✓	✓	✓	✓	
Version of Protocol (lower) **[READ ONLY]**	266	40267	Version of Protocol is a value in BCD e.g. V3.01 = 3 (upper) and 1 (lower)	✓	✓	✓	✓	✓	✓	
Version of Model (upper) **[READ ONLY]**	267	40268	Version of Model is a value in BCD e.g. V2.00 = 2 (upper) and 0 (lower)	✓	✓	✓	✓	✓	✓	
Version of Model (lower) **[READ ONLY]**	268	40269	Version of Model is a value in BCD e.g. V2.00 = 2 (upper) and 0 (lower)	✓	✓	✓	✓	✓	✓	
Capacity of Supplying Electricity **[READ ONLY]**	269	40270	Value in Watts 0 = 0,0 W … 255 = 25,5 W	✓	✓	✓	✓	✓	✓	
Model Profile 1 **[READ ONLY]**	270	40271	0 = FTC2B 1 = FTC4 2 = FTC5 128 = CAHV1A (CAHV Master) 129 = CAHV1B (CAHV Slave) 130 = CRHV1A (CRHV Master) 131 = CRHV1B (CRHV Slave) 144 = PWFY1	✓	✓	✓	✓	✓	✓	
Model Profile 2 (refrigerant address) **[READ ONLY]**	271	40272	0 = Address 0 … 255 = Address 255 (addresses 7 – 255 not used for FTC)	✓	✓	✓	✓	✓	✓	

* Temperature in ºC multiplied by 100.
  0x8000 = -327.68ºC
  0x8001 = -327.67ºC
  …
  0xFFFF = -0.01ºC
  0x0000 = 0.00ºC
  …
  0x7FFE = 327.66ºC
  0x7FFF = 327.67ºC

** Temperature in ºC multiplied by 100.
  0x0000 = 0.00ºC
  0x0001 = 0.01ºC
  …
  0x7FFE = 327.66ºC
  0x7FFF = 327.67ºC

^ 7-Segment Display Error Code Digit 1
  0 = A
  1 = b
  2 = E
  3 = F
  4 = J
  5 = L
  6 = P
  7 = U

^^ 7-Segment Display Error Code Digit 2
1 – 15 = 1 - F
16 = O
17 = H
18 = J
19 = L
20 = P
21 = U

† Electric Energy
0x0000 = 0.00 kWh
0x0001 = 0.01 kWh
…
0xFFFE = 655.34 kWh
0xFFFF = 655.35 kWh

†† MRC Prohibit command must NOT be written to Shizuoka designed models

#1 Value always read as 0 on CAHV/CRHV 2013 models
#2 Value always read as 0 on CAHV/CRHV 2013 models
#3 Value always read as 0 on CAHV/CRHV 2013 models
#4 Stop and Cooling modes not supported on CAHV 2013 models
#5 Stop, Cooling and Legionella modes not supported on CRHV 2013 models
#6 This value is read only on FTC4 models
#7 Bit 4 not supported on CAHV/CRHV 2013 models
#8 This setting is not supported on CAHV/CRHV 2013 models
#9 Range is -30..+50ºC for CRHV/CAHV models
#10 Range is 0..+50ºC for CRHV/CAHV models
#11 Range is +30..+65ºC for CAHV models
#12 Range is +25..+65ºC for CRHV models

11.6. Input registers

Input Registers are read using function code 04.

Input Register (Analogue Input)				Applicable Unit Type						
Register Name	**Addr**	**Modicon Address**	**Details**	**FTC4**	**FTC5**	**CAHV master**	**CAHV slave**	**CRHV master**	**CRHV slave**	
Fault/Error Code (hex)	1	30002	0x8000 = No error 0x6999 = Bad communication with unit (Refer to indoor unit documentation for description of other fault code values)	✓	✓	✓		✓		
A1M Firmware Version	3	30004	A1M Firmware Version	✓	✓	✓	✓	✓	✓	
Modbus Comms Counter	5	30006	Value of a counter which increments upon every valid Modbus command received. Value will automatically reset to zero when value exceeds 65535.	✓	✓	✓	✓	✓	✓	
Fault Code (decimal)	8	30009	8000 = No error 6999 = Bad communication between A1M and unit (Refer to unit documentation for description of other fault code values)	✓	✓	✓		✓		
System Type Detected	9	30010	0 = A1M has detected an ATA unit connected 1 = A1M has detected an ATW system connected	✓	✓	✓	✓	✓	✓	
Own Refrigerant Address	25	30026	0 … 32	✓	✓					
Defrost	26	30027	0 = Normal 1 = Standby 2 = Defrost 3 = Waiting Restart	✓	✓	✓				
Residual Heat Removal	27	30028	0 = Normal 1 = Prepared 2 = Residual Heat Removal	✓	✓					
Refrigerant Error Info	28	30029	0 = Normal 1 = Error (System) 2 = Error (Startup) 3 = Maintenance Error	✓	✓	✓		✓		
7-Segment Display Error Code Digit 1	29	30030	(see note ^)	✓	✓					
7-Segment Display Error Code Digit 2	30	30031	(see note ^^)	✓	✓					
Status Of Heating	31	30032	0 = No type 1 = Heating C1 2 = Heating C2 3 = Heating C3	✓						
			0 = No type 1 = Heating/Cooling A1, Heating/Cooling B1, Heating/Cooling C1 2 = Heating/Cooling A2, Heating/Cooling B2, Heating/Cooling C2 3 = Heating/Cooling A3, Heating/Cooling B3, Heating/Cooling C3		✓					
Heat Pump Frequency – Master	32	30033	Frequency value in Hz 0 = 0Hz … 255 = 255Hz	✓	✓	✓		✓		
Heat Pump Frequency – Slave 1	33	30034	Frequency value in Hz 0 = 0Hz … 255 = 255Hz	✓	✓	✓		✓		
Heat Pump Frequency – Slave 2	34	30035	Frequency value in Hz 0 = 0Hz … 255 = 255Hz	✓	✓	✓		✓		

Heat Pump Frequency – Slave 3	35	30036	Frequency value in Hz 0 = 0Hz … 255 = 255Hz	✓	✓	✓		✓		
Heat Pump Frequency – Slave 4	36	30037	Frequency value in Hz 0 = 0Hz … 255 = 255Hz	✓	✓	✓		✓		
Heat Pump Frequency – Slave 5	37	30038	Frequency value in Hz 0 = 0Hz … 255 = 255Hz	✓	✓	✓		✓		
Heat Pump Frequency – Slave 6	38	30039	Frequency value in Hz 0 = 0Hz … 255 = 255Hz	✓	✓	✓		✓		
Heat Source Status	39	30040	0 = H/P 1 = IH 2 = BH 3 = IH + BH 4 = Boiler	✓	✓					
Temperature Setpoint – Zone 1 (signed)	40	30041	Temperature value in ºC multiplied by 100. (see note *)	✓	✓					
Temperature Setpoint – Zone 1	41	30042	Temperature value in ºC multiplied by 100. (see note **)	✓	✓					
Temperature Setpoint – Zone 2 (signed)	42	30043	Temperature value in ºC multiplied by 100. (see note *)	✓	✓					
Temperature Setpoint – Zone 2	43	30044	Temperature value in ºC multiplied by 100. (see note **)	✓	✓					
Flow Temperature Setpoint – Zone 1 (signed)	44	30045	Temperature value in ºC multiplied by 100. (see note *)	✓	✓	✓		✓		
Flow Temperature Setpoint – Zone 1	45	30046	Temperature value in ºC multiplied by 100. (see note **)	✓	✓	✓		✓		
Flow Temperature Setpoint – Zone 2 (signed)	46	30047	Temperature value in ºC multiplied by 100. (see note *)	✓	✓					
Flow Temperature Setpoint – Zone 2	47	30048	Temperature value in ºC multiplied by 100. (see note **)	✓	✓					
Legionella Temperature Setpoint (signed)	48	30049	Temperature value in ºC multiplied by 100. (see note *)	✓	✓					
Legionella Temperature Setpoint	49	30050	Temperature value in ºC multiplied by 100. (see note **)	✓	✓					
DHW Temperature Drop (signed)	50	30051	Temperature value in ºC multiplied by 10. 0xFF38 = -20.0ºC … 0x0433 = 107.5ºC	✓	✓					
DHW Temperature Drop	51	30052	Temperature value in ºC multiplied by 10. 0x0000 = 0ºC … 0x0433 = 107.5ºC 0 = 0.0ºC … 1075 = 107.5ºC	✓	✓					
Room Temperature – Zone 1 (signed)	52	30053	Temperature value in ºC multiplied by 100. (see note *)	✓	✓					
Room Temperature – Zone 1	53	30054	Temperature value in ºC multiplied by 100. (see note **)	✓	✓					
Room Temperature – Zone 2 (signed)	54	30055	Temperature value in ºC multiplied by 100. (see note *)	✓	✓					
Room Temperature – Zone 2	55	30056	Temperature value in ºC multiplied by 100. (see note **)	✓	✓					
Refrigerant Liquid Temperature (signed)	56	30057	Temperature value in ºC multiplied by 100. (see note *)	✓	✓					
Refrigerant Liquid Temperature	57	30058	Temperature value in ºC multiplied by 100. (see note **)	✓	✓					
Outdoor Ambient Temperature (signed)	58	30059	Temperature value in ºC multiplied by 10. 0xFE70 = -40.0ºC … 0x036B = 87.5ºC	✓	✓	✓	✓			
Outdoor Ambient Temperature	59	30060	Temperature value in ºC multiplied by 10. 0x0000 = 0.0ºC ... 0x036B = 87.5ºC.	✓	✓	✓	✓			
Flow Temperature (signed)	60	30061	Temperature value in ºC multiplied by 100. (see note *)	✓	✓					

Water Outlet Temperature (signed)			Temperature value in ºC multiplied by 100. (see note *)			✓	✓	✓	✓	
Flow Temperature	61	30062	Temperature value in ºC multiplied by 100. (see note **)	✓	✓					
Water Outlet Temperature			Temperature value in ºC multiplied by 100. (see note **)			✓	✓	✓	✓	
Return Temperature (signed)	62	30063	Temperature value in ºC multiplied by 100. (see note *)	✓	✓					
Water Inlet Temperature (signed)			Temperature value in ºC multiplied by 100. (see note *)			✓	✓	✓	✓	
Return Temperature	63	30064	Temperature value in ºC multiplied by 100. (see note **)	✓	✓					
Water Inlet Temperature			Temperature value in ºC multiplied by 100. (see note **)			✓	✓	✓	✓	
Tank Water Temperature (signed)	64	30065	Temperature value in ºC multiplied by 100. (see note *)	✓	✓					
Tank Water Temperature	65	30066	Temperature value in ºC multiplied by 100. (see note **)	✓	✓					
Flow Temperature – Zone 1 (signed)	66	30067	Temperature value in ºC multiplied by 100. (see note *)	✓	✓					
External Water Temperature 1 (signed)			Temperature value in ºC multiplied by 100. (see note *)			✓		✓		
Flow Temperature – Zone 1	67	30068	Temperature value in ºC multiplied by 100. (see note **)	✓	✓					
External Water Temperature 1			Temperature value in ºC multiplied by 100. (see note **)			✓		✓		
Return Temperature – Zone 1 (signed)	68	30069	Temperature value in ºC multiplied by 100. (see note *)	✓	✓					
Return Temperature – Zone 1	69	30070	Temperature value in ºC multiplied by 100. (see note **)	✓	✓					
Flow Temperature – Zone 2 (signed)	70	30071	Temperature value in ºC multiplied by 100. (see note *)	✓	✓					
External Water Temperature 2 (signed)			Temperature value in ºC multiplied by 100. (see note *)			✓		✓		
Flow Temperature – Zone 2	71	30072	Temperature value in ºC multiplied by 100. (see note **)	✓	✓					
External Water Temperature 2			Temperature value in ºC multiplied by 100. (see note **)			✓		✓		
Return Temperature – Zone 2 (signed)	72	30073	Temperature value in ºC multiplied by 100. (see note *)	✓	✓					
Return Temperature – Zone 2	73	30074	Temperature value in ºC multiplied by 100. (see note **)	✓	✓					
Boiler Flow Temperature (signed)	74	30075	Temperature value in ºC multiplied by 100. (see note *)	✓	✓					
Boiler Flow Temperature	75	30076	Temperature value in ºC multiplied by 100. (see note **)	✓	✓					
Boiler Return Temperature (signed)	76	30077	Temperature value in ºC multiplied by 100. (see note *)	✓	✓					
Boiler Return Temperature	77	30078	Temperature value in ºC multiplied by 100. (see note **)	✓	✓					
DIP Switch SW2	78	30079	Bit 0 = Switch 2-1 (0 = OFF, 1 = ON) … Bit 9 = Switch 2-10 (0 = OFF, 1 = ON)	✓	✓					
Heat Pump Run Time (hours)	79	30080	Value in hours 0 = 0 Hours … 99 = 99 Hours	✓	✓	✓		✓		

Heat Pump Run Time (hours x100)	80	30081	Value in hours multiplied by 100 0 = 0 hours … 65535 = 6553500 hours	✓	✓	✓		✓		
Heat Pump Refrigerant Address 1 Run Time (hours x100)	81	30082	Value in hours multiplied by 100 0 = 0 hours … 65535 = 6553500 hours	✓	✓					
Heat Pump Refrigerant Address 2 Run Time (hours x100)	82	30083	Value in hours multiplied by 100 0 = 0 hours … 65535 = 6553500 hours	✓	✓					
Heat Pump Refrigerant Address 3 Run Time (hours x100)	83	30084	Value in hours multiplied by 100 0 = 0 hours … 65535 = 6553500 hours	✓	✓					
Heat Pump Refrigerant Address 4 Run Time (hours x100)	84	30085	Value in hours multiplied by 100 0 = 0 hours … 65535 = 6553500 hours	✓	✓					
Heat Pump Refrigerant Address 5 Run Time (hours x100)	85	30086	Value in hours multiplied by 100 0 = 0 hours … 65535 = 6553500 hours	✓	✓					
Heat Pump Refrigerant Address 6 Run Time (hours x100)	86	30087	Value in hours multiplied by 100 0 = 0 hours … 65535 = 6553500 hours	✓	✓					
Mixing Valve Step	87	30088	0 = Step 0 … 10 = Step 10	✓	✓					
Refrigerant 1 Error Code Digit 1	88	30089	(see note ^)	✓	✓					
Refrigerant 1 Error Code Digit 2	89	30090	(see note ^^)	✓	✓					
Refrigerant 2 Error Code Digit 1	90	30091	(see note ^)	✓	✓					
Refrigerant 2 Error Code Digit 2	91	30092	(see note ^^)	✓	✓					
Refrigerant 3 Error Code Digit 1	92	30093	(see note ^)	✓	✓					
Refrigerant 3 Error Code Digit 2	93	30094	(see note ^^)	✓	✓					
Refrigerant 4 Error Code Digit 1	94	30095	(see note ^)	✓	✓					
Refrigerant 4 Error Code Digit 2	95	30096	(see note ^^)	✓	✓					
Refrigerant 5 Error Code Digit 1	96	30097	(see note ^)	✓	✓					
Refrigerant 5 Error Code Digit 2	97	30098	(see note ^^)	✓	✓					
Refrigerant 6 Error Code Digit 1	98	30099	(see note ^)	✓	✓					
Refrigerant 6 Error Code Digit 2	99	30100	(see note ^^)	✓	✓					
Heat Pump Frequency – Slave 7	100	30101	Frequency value in Hz 0 = 0Hz … 255 = 255Hz			✓		✓		
Heat Pump Frequency – Slave 8	101	30102	Frequency value in Hz 0 = 0Hz … 255 = 255Hz			✓		✓		
Heat Pump Frequency – Slave 9	102	30103	Frequency value in Hz 0 = 0Hz … 255 = 255Hz			✓		✓		
Heat Pump Frequency – Slave 10	103	30104	Frequency value in Hz 0 = 0Hz … 255 = 255Hz			✓		✓		

Heat Pump Frequency – Slave 11	104	30105	Frequency value in Hz 0 = 0Hz … 255 = 255Hz			✓		✓		
Heat Pump Frequency – Slave 12	105	30106	Frequency value in Hz 0 = 0Hz … 255 = 255Hz			✓		✓		
Heat Pump Frequency – Slave 13	106	30107	Frequency value in Hz 0 = 0Hz … 255 = 255Hz			✓		✓		
Heat Pump Frequency – Slave 14	107	30108	Frequency value in Hz 0 = 0Hz … 255 = 255Hz			✓		✓		
Heat Pump Frequency – Slave 15	108	30109	Frequency value in Hz 0 = 0Hz … 255 = 255Hz			✓		✓		
Evaporating Temperature (signed)	109	30110	Temperature value in ºC multiplied by 100. (see note *)			✓		✓		
Evaporating Temperature	110	30111	Temperature value in ºC multiplied by 100. (see note **)			✓		✓		
Condensing Temperature (signed)	111	30112	Temperature value in ºC multiplied by 100. (see note *)			✓		✓		
Condensing Temperature	112	30113	Temperature value in ºC multiplied by 100. (see note **)			✓		✓		
Electric Energy 1	113	30114	Electric Energy in kWh multiplied by 100 (see note †)			✓#1	✓#1	✓#1	✓#1	
Electric Energy 2	114	30115	Electric Energy in kWh multiplied by 100 (see note †)			✓#1	✓#1	✓#1	✓#1	
Electric Energy 3	115	30116	Electric Energy in kWh multiplied by 100 (see note †)			✓#1	✓#1	✓#1	✓#1	
Electric Energy 4	116	30117	Electric Energy in kWh multiplied by 100 (see note †)			✓#1	✓#1	✓#1	✓#1	
Electric Energy 5	117	30118	Electric Energy in kWh multiplied by 100 (see note †)			✓#1	✓#1	✓#1	✓#1	
Electric Energy 6	118	30119	Electric Energy in kWh multiplied by 100 (see note †)			✓#1	✓#1	✓#1	✓#1	
Electric Energy 7	119	30120	Electric Energy in kWh multiplied by 100 (see note †)			✓#1	✓#1	✓#1	✓#1	
Electric Energy 8	120	30121	Electric Energy in kWh multiplied by 100 (see note †)			✓#1	✓#1	✓#1	✓#1	
Electric Energy 9	121	30122	Electric Energy in kWh multiplied by 100 (see note †)			✓#1	✓#1	✓#1	✓#1	
Electric Energy 10	122	30123	Electric Energy in kWh multiplied by 100 (see note †)			✓#1	✓#1	✓#1	✓#1	
Electric Energy 11	123	30124	Electric Energy in kWh multiplied by 100 (see note †)			✓#1	✓#1	✓#1	✓#1	
Electric Energy 12	124	30125	Electric Energy in kWh multiplied by 100 (see note †)			✓#1	✓#1	✓#1	✓#1	
Electric Energy 13	125	30126	Electric Energy in kWh multiplied by 100 (see note †)			✓#1	✓#1	✓#1	✓#1	
Electric Energy 14	126	30127	Electric Energy in kWh multiplied by 100 (see note †)			✓#1	✓#1	✓#1	✓#1	
Electric Energy 15	127	30128	Electric Energy in kWh multiplied by 100 (see note †)			✓#1	✓#1	✓#1	✓#1	
Electric Energy 16	128	30129	Electric Energy in kWh multiplied by 100 (see note †)			✓#1	✓#1	✓#1	✓#1	
Brine Inlet Temperature (signed)	129	30130	Temperature value in ºC multiplied by 100. (see note *)					✓	✓	
Brine Inlet Temperature	130	30131	Temperature value in ºC multiplied by 100. (see note **)					✓	✓	

Brine Outlet Temperature 1 (signed)	131	30132	Temperature value in ºC multiplied by 100. (see note *)					✓	✓	
Brine Outlet Temperature 1	132	30133	Temperature value in ºC multiplied by 100. (see note **)					✓	✓	
Brine Outlet Temperature 2 (signed)	133	30134	Temperature value in ºC multiplied by 100. (see note *)					✓	✓	
Brine Outlet Temperature 2	134	30135	Temperature value in ºC multiplied by 100. (see note **)					✓	✓	
Condensing Temperature 2 (signed)	135	30136	Temperature value in ºC multiplied by 100. (see note *)					✓	✓	
Condensing Temperature 2	136	30137	Temperature value in ºC multiplied by 100. (see note **)					✓	✓	
Water Outlet Temperature 2 (signed)	137	30138	Temperature value in ºC multiplied by 100. (see note *)					✓	✓	
Water Outlet Temperature 2	138	30139	Temperature value in ºC multiplied by 100. (see note **)					✓	✓	
Evaporating Temperature 2 (signed)	139	30140	Temperature value in ºC multiplied by 100. (see note *)					✓	✓	
Evaporating Temperature 2	140	30141	Temperature value in ºC multiplied by 100. (see note **)					✓	✓	
Water Pump 1 – PWM Duty	141	30142	Duty value in % 0 = 0% … 100 = 100%			✓	✓	✓#1	✓#1	
Water Pump 1 – PWM Duty Feedback	142	30143	Duty value in % 0 = 0% … 100 = 100%			✓#1	✓#1	✓#1	✓#1	
3-Way Valve 1	143	30144	0 = OFF (stop) 1 = ON (run)			✓		✓		
H/C Control Type	144	30145	0 = Heating 1 = Cooling	✓	✓					
MRC Prohibit	145	30146	Bit packed value: Bit 0 – System On/Off (0 = ON, 1 = Prohibit) Bit 1 – Running Mode (0 = ON, 1 = Prohibit) Bit 2 – Setting Temp (0 = ON, 1 = Prohibit) Bit 3 – Undefined (always 0) Bit 4 – Function Setting (0 = Normal, 1 = Function Setting) Bits 5, 6 and 7 – Undefined (always 0)	✓	✓	✓		✓		
Version of Protocol (upper)	146	30147	Version of Protocol is a value in BCD e.g. V3.01 = 3 (upper) and 1 (lower)	✓	✓	✓	✓	✓	✓	
Version of Protocol (lower)	147	30148	Version of Protocol is a value in BCD e.g. V3.01 = 3 (upper) and 1 (lower)	✓	✓	✓	✓	✓	✓	
Version of Model (upper)	148	30149	Version of Model is a value in BCD e.g. V2.00 = 2 (upper) and 0 (lower)	✓	✓	✓	✓	✓	✓	
Version of Model (lower)	149	30150	Version of Model is a value in BCD e.g. V2.00 = 2 (upper) and 0 (lower)	✓	✓	✓	✓	✓	✓	
Capacity of Supplying Electricity	150	30151	Value in Watts 0 = 0,0 W … 255 = 25,5 W	✓	✓	✓	✓	✓	✓	
Model Profile 1	151	30152	0 = FTC2B 1 = FTC4 2 = FTC5 128 = CAHV1A 129 = CAHV1B 130 = CRHV1A 131 = CRHV1B 144 = PWFY1	✓	✓	✓	✓	✓	✓	
Model Profile 2 (refrigerant address)	152	30153	0 = Address 0 … 255 = Address 255 (addresses 7 – 255 not used for FTC)	✓	✓	✓	✓	✓	✓	

* Temperature in ºC multiplied by 100.
0x8000 = -327.68ºC
0x8001 = -327.67ºC
…
0xFFFF = -0.01ºC
0x0000 = 0.00ºC
…
0x7FFE = 327.66ºC
0x7FFF = 327.67ºC

** Temperature in ºC multiplied by 100.
0x0000 = 0.00ºC
0x0001 = 0.01ºC
…
0x7FFE = 327.66ºC
0x7FFF = 327.67ºC

^ 7-Segment Display Error Code Digit 1
0 = A
1 = b
2 = E
3 = F
4 = J
5 = L
6 = P
7 = U

^^ 7-Segment Display Error Code Digit 2
1 – 15 = 1 - F
16 = O
17 = H
18 = J
19 = L
20 = P
21 = U

† Electric Energy
0x0000 = 0.00 kWh
0x0001 = 0.01 kWh
…
0xFFFE = 655.34 kWh
0xFFFF = 655.35 kWh

#1 Value always read as 0 on CAHV/CRHV 2013 models

11.7. Coils

Coils are read using function code 01 and written to using either function code 05 or 15. Function code 05 is used when writing to a single coil register, function code 15 is used for writing to multiple coil registers in the same command.

Coil (Digital Output)				Applicable Unit Type						
Register Name	**Addr**	**Modicon Address**	**Details**	**FTC4**	**FTC5**	**CAHV master**	**CAHV slave**	**CRHV master**	**CRHV slave**	
System ON/OFF	1	00002	0 = System OFF 1 = System ON (Note: Reading back value 1 could indicate the unit is in Emergency Run or Test Run mode)	✓	✓	✓		✓		

11.8. Discrete Inputs

Discrete Inputs are read using function code 02.

Discrete Input (Digital Input)				Applicable Unit Type						
Register Name	**Addr**	**Modicon Address**	**Details**	**FTC4**	**FTC5**	**CAHV master**	**CAHV slave**	**CRHV master**	**CRHV slave**	
Room Thermo 1 (IN1)	0	10001	0 = OFF, 1 = ON	✓	✓					
Room Thermo 2 (IN6)	1	10002	0 = OFF, 1 = ON	✓	✓					
Flow SW1 (IN2)	2	10003	0 = OFF, 1 = ON	✓	✓					
Flow SW2 (IN3)	3	10004	0 = OFF, 1 = ON	✓	✓					
Flow SW3 (IN7)	4	10005	0 = OFF, 1 = ON	✓	✓					
Demand (IN4)	5	10006	0 = OFF, 1 = ON	✓	✓					
Outdoor Thermo (IN5)	6	10007	0 = OFF, 1 = ON	✓	✓					
Heat Pump Master ON/OFF	7	10008	0 = Stop, 1 = Run	✓	✓	✓		✓		
Heat Pump Slave 1 ON/OFF (address 2 for CAHV/CRHV)	8	10009	0 = Stop, 1 = Run	✓	✓	✓		✓		
Heat Pump Slave 2 ON/OFF (address 3 for CAHV/CRHV)	9	10010	0 = Stop, 1 = Run	✓	✓	✓		✓		
Heat Pump Slave 3 ON/OFF (address 4 for CAHV/CRHV)	10	10011	0 = Stop, 1 = Run	✓	✓	✓		✓		
Heat Pump Slave 4 ON/OFF (address 5 for CAHV/CRHV)	11	10012	0 = Stop, 1 = Run	✓	✓	✓		✓		
Heat Pump Slave 5 ON/OFF (address 6 for CAHV/CRHV)	12	10013	0 = Stop, 1 = Run	✓	✓	✓		✓		
Heat Pump Slave 6 ON/OFF (address 7 for CAHV/CRHV)	13	10014	0 = Stop, 1 = Run	✓	✓	✓		✓		
Heat Pump Slave 7 ON/OFF (address 8 for CAHV/CRHV)	14	10015	0 = Stop, 1 = Run			✓		✓		
Heat Pump Slave 8 ON/OFF (address 9 for CAHV/CRHV)	15	10016	0 = Stop, 1 = Run			✓		✓		
Boiler ON/OFF	16	10017	0 = Stop, 1 = Run	✓	✓					
External Heater Operation 1			0 = Stop, 1 = Run			✓		✓		
Booster Heater 1 ON/OFF	17	10018	0 = Stop, 1 = Run	✓	✓					
Booster Heater 2 ON/OFF	18	10019	0 = Stop, 1 = Run	✓	✓					
Booster Heater 2+ ON/OFF	19	10020	0 = Stop, 1 = Run	✓	✓					

Immersion Heater ON/OFF	20	10021	0 = Stop, 1 = Run	✓	✓					
Water Pump 1 ON/OFF	21	10022	0 = Stop, 1 = Run	✓	✓	✓		✓		
Water Pump 2 ON/OFF	22	10023	0 = Stop, 1 = Run	✓	✓	✓		✓		
Water Pump 3 ON/OFF	23	10024	0 = Stop, 1 = Run	✓	✓	✓		✓		
3-Way Valve ON/OFF	24	10025	0 = Stop, 1 = Run	✓	✓					
2-Way Valve 2 ON/OFF	25	10026	0 = Stop, 1 = Run	✓	✓					
Heat Pump 10 ON/OFF	26	10027	0 = Stop, 1 = Run			✓		✓		
Heat Pump 11 ON/OFF	27	10028	0 = Stop, 1 = Run			✓		✓		
Heat Pump 12 ON/OFF	28	10029	0 = Stop, 1 = Run			✓		✓		
Heat Pump 13 ON/OFF	29	10030	0 = Stop, 1 = Run			✓		✓		
Heat Pump 14 ON/OFF	30	10031	0 = Stop, 1 = Run			✓		✓		
Heat Pump 15 ON/OFF	31	10032	0 = Stop, 1 = Run			✓		✓		
Heat Pump 16 ON/OFF	32	10033	0 = Stop, 1 = Run			✓		✓		
Heat Pump 17 ON/OFF	33	10034	0 = Stop, 1 = Run			✓		✓		
Heat Pump 18 ON/OFF	34	10035	0 = Stop, 1 = Run			✓#1		✓#1		
Heat Pump 19 ON/OFF	35	10036	0 = Stop, 1 = Run			✓#1		✓#1		
Heat Pump 20 ON/OFF	36	10037	0 = Stop, 1 = Run			✓#1		✓#1		
Heat Pump 21 ON/OFF	37	10038	0 = Stop, 1 = Run			✓#1		✓#1		
Heat Pump 22 ON/OFF	38	10039	0 = Stop, 1 = Run			✓#1		✓#1		
Heat Pump 23 ON/OFF	39	10040	0 = Stop, 1 = Run			✓#1		✓#1		
Heat Pump 24 ON/OFF	40	10041	0 = Stop, 1 = Run			✓#1		✓#1		
Heat Pump 25 ON/OFF	41	10042	0 = Stop, 1 = Run			✓#1		✓#1		
Heat Pump 26 ON/OFF	42	10043	0 = Stop, 1 = Run			✓#1		✓#1		
Heat Pump 27 ON/OFF	43	10044	0 = Stop, 1 = Run			✓#1		✓#1		
Heat Pump 28 ON/OFF	44	10045	0 = Stop, 1 = Run			✓#1		✓#1		
Heat Pump 29 ON/OFF	45	10046	0 = Stop, 1 = Run			✓#1		✓#1		
Heat Pump 30 ON/OFF	46	10047	0 = Stop, 1 = Run			✓#1		✓#1		

Heat Pump 31 ON/OFF	47	10048	0 = Stop, 1 = Run			✓[#1]		✓[#1]		
Heat Pump 32 ON/OFF	48	10049	0 = Stop, 1 = Run			✓[#1]		✓[#1]		
	49 - 64	10050 - 10065	Reserved							
External Heater ON/OFF	65	10066	0 = Stop, 1 = Run			✓		✓[#1]		
Water Pump 4 ON/OFF	66	10067	0 = Stop, 1 = Run			✓		✓		
Water Pump 5 ON/OFF	67	10068	0 = Stop, 1 = Run			✓		✓		
Water Pump 6 ON/OFF	68	10069	0 = Stop, 1 = Run			✓		✓		
Water Pump 7 ON/OFF	69	10070	0 = Stop, 1 = Run			✓		✓		
Water Pump 8 ON/OFF	70	10071	0 = Stop, 1 = Run			✓		✓		
Water Pump 9 ON/OFF	71	10072	0 = Stop, 1 = Run			✓		✓		
Water Pump 10 ON/OFF	72	10073	0 = Stop, 1 = Run			✓		✓		
Water Pump 11 ON/OFF	73	10074	0 = Stop, 1 = Run			✓		✓		
Water Pump 12 ON/OFF	74	10075	0 = Stop, 1 = Run			✓		✓		
Water Pump 13 ON/OFF	75	10076	0 = Stop, 1 = Run			✓		✓		
Water Pump 14 ON/OFF	76	10077	0 = Stop, 1 = Run			✓		✓		
Water Pump 15 ON/OFF	77	10078	0 = Stop, 1 = Run			✓		✓		
Water Pump 16 ON/OFF	78	10079	0 = Stop, 1 = Run			✓		✓		
Drain Pan Heater ON/OFF	79	10080	0 = Stop, 1 = Run			✓	✓			

[#1] Value always read as 0 on CAHV/CRHV 2013 models

Appendix A – Compatible Air-To-Air units

UK Models

M Series
MSZ-SF25/35/50VE
MSZ-GF60/71VE
MSZ-EF25/35/50VES/VEW/VEB
MSZ-FH25/35VE
MSZ-FD25/35VA
MSZ-GE22/25/35/50/60/71VA
MSZ-GC22/25/35VA
MSZ-GB50VA
MSZ-GA22/25/35/50/60/71VA
MFZ-KA25/35/50VA

Mr Slim
PCA-RP50/60/71/100/125/140KAQ
PEAD-RP35/50/60/71/100/125/140JAQ
PEAD-RP35/50/60/71/100/125/140EA/EA2
PEA-RP200/250GAQ
PKA-RP35/50HAL
PKA-RP60/71/100KAL
PLA-ZRP35/50/60/71/100/125/140BA/BA2
PLA-RP35/50/60/71/100/125/140BA/BA2/BA3
PLA-RP35/50/60/71/100/125/140AA/AA2
PSA-RP71/100/125/140KA
PSA-RP71/100/125/140GA
SEZ-KD25/35/50/60/71VAQ
SEZ-KA35/50/60/71VA
SLZ-KA25/35/50VAQ
SLZ-KA25/35/50VA

Models Not Supported:
MSZ-HJ25/35VA
MSZ-HC25/35VA/VAB
PCA-RP71/125HA/HAQ
PEA-RP400/500GAQ

Appendix B – Compatible Air-To-Water units

UK Models

Ecodan FTC4 Controllers:

PAC-IF052B-E
PAC-IF051B-E

Ecodan FTC4 Hydrobox:
EHSC-VM6B
EHSC-YM9B
EHSC-VM6EB
EHSC-YM9EB
EHPX-VM2B
EHPX-VM6B
EHPX-YM9B
ERSC-VM2B
EHSC-VM2B
EHSC-TM9B

Ecodan FTC4 Cylinder:
EHST20C-VM6HB
EHST20C-YM9HB
EHST20C-VM6B
EHST20C-YM9B
EHST20C-VM6EB
EHST20C-YM9EB
EHST20C-VM6SB
EHPT20X-VM2HB
EHPT20X-VM6HB
EHPT20X-YM9HB
EHPT20X-VM6B
EHPT20X-YM9B
EHST-20CVM2B
EHST20C-TM9HB
EHPT20X-TM9HB

Ecodan Ground Source Heat Pump:
CRHV-P600YA-HPB

Ecodan Air Source Heat Pump:
CAHV-P500YB-HPB

Please be sure to put the contact address/telephone number on this manual before handing it to the customer.

MITSUBISHI ELECTRIC UK

MITSUBISHI ELECTRIC UK, TRAVELLERS LANE, HATFIELD, HERTFORDSHIRE, AL10 8XB